MINING CONGRESS JOURNAL





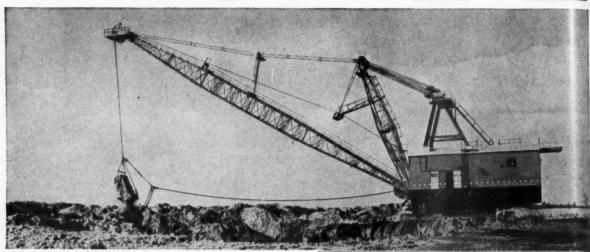
EBRUARY





ANNUAL MINING REVIEW

Turn Half of Your Dragline Replacement Costs into Profits



Many Have By Switching



Twice The Service means half the cost—and that's exactly the kind of service Tuffy is now giving to many mine operators! By cutting dragline replacement costs 50%, you get extra profits that you're now losing. Figure out how much that could mean to you in actual dollars and cents!

Big, Modern Equipment—like the giant walking draglines and high capacity drag buckets—is designed for more efficient stripping. But you have to keep those big boys on the job to get the most out of your investment! Tuffy Dragline has the extra stamina, flexibility and abrasive resistance the big ones need...helps you move more material up to twice as long!

Try Tuffy Dragline on your own drags. Compare the service you get from Tuffy to the service you're now getting...and see how much more cents-a-ton profit you may make with Tuffy Dragline!





Designed to take the punishment of small winch drums and small sheaves...the shock of blade manipulation under toughest going!





9 - part, machine braided wire fabric construction is extra flexible, extra strong . . resists looping and kinking, fights off damagel



Rigid, non-collapsing to eliminate drum crushing . . . elastic and flexible to take shock loads!

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Wire Rope Corporation

2144 Manchester Avenue

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Specialists In High Carbon Wire, Wire Rope and Braided Wire Fabric

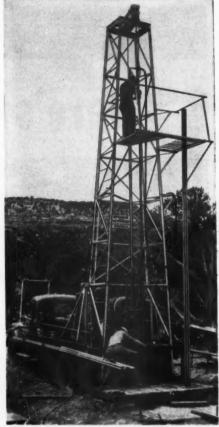
CONTRACT DIAMON Anywhere Any Time

For more than sixty years Sprague & Henwood, Inc. has been a leader in the field of Contract Diamond Drilling. During this long period of time our crews have completed thousands of contracts successfully in every corner of the globe—under every conceivable operating condition. Today we have a large force of expert operators and an ample supply of modern equipment, so that we can undertake almost any iob—anywhere—on very short notice.

Besides exploratory core drilling, from the surface or underground, our service includes blast-hole drilling, directional drilling, foundation test drilling, grout-hole drilling and pressure grouting. Estimates, and constructive suggestions when possible, submitted promptly on request.

High-Speed Core Drilling Machines and Complete Accessory Equipment

The same high-speed core drilling machines and improved accessory equipment that we manufacture, in our own extensive shops, for our own requirements, is equally available to other operators and can be relied upon for best-possible all-round results at lowest ultimate expense. Model 40-C is our latest core drilling machine and is recommended for holes up to 1000 ft. in depth. Other modern machines provide for deeper core drilling and for either blast-hole drilling A Sprague & Henwood Drilling Rig in or core drilling underground. Write for illustrated bulletins.



the Colorado Uranium Field.



Cut Faster—Last Longer—Cost No More

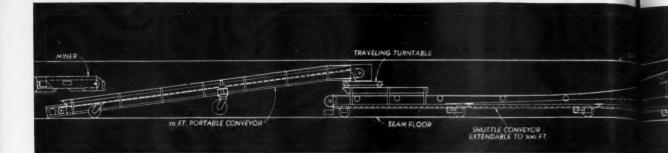
Always a leader in its field, Sprague & Henwood, Inc. pioneered the development of oriented diamond bits, in which each individual diamond is set with its hardest edge or "vector" toward the work and has proved by extensive comparative tests that they last much longer and cut much faster than ordinary bits in which the diamonds are set at random. Only selected diamonds of suitable crystaline structure can be used and only specially trained and equipped setters can be relied upon to orient the diamonds correctly in the mold, but we are now fully organized to produce Oriented Diamond Bits efficiently and are furnishing them at no additional charge.

In terms of Footage Cost, these are the Most Economical Diamond Bits ever produced and we invite inquiries on that basis. Bulletin 320 illustrates and describes all types and gives complete working data.

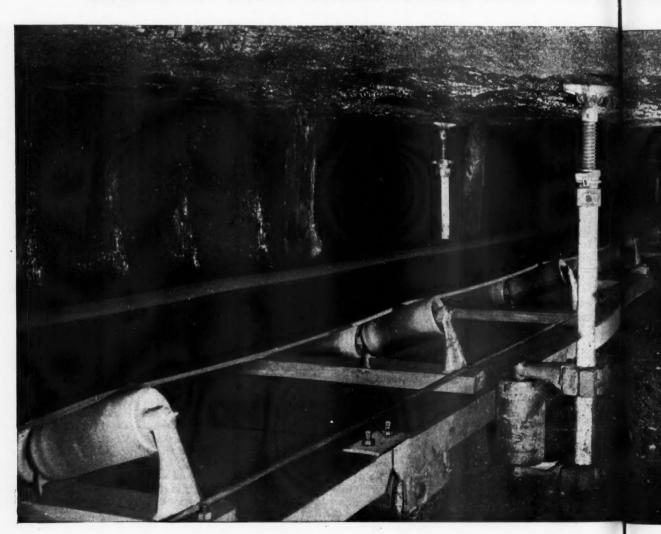
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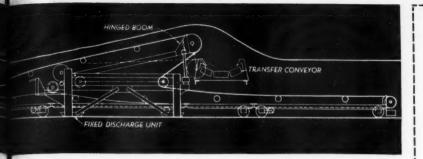
HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

[Page 2]

DOME

FOREIG Paris, F



Continuous Mining



It's The Hewitt-Robins Mine Type Shuttle Conveyor With Fixed Tripper

The Hewitt-Robins Mine Type Shuttle Conveyor with fixed tripper forms the final link in a complete belt conveyor system that can handle an uninterrupted flow of coal directly from the face to preparation plant as fast as any mechanism can produce it.

This versatile unit is the key to truly continuous mining. The Shuttle Conveyor is both extendable and retractable—can follow the progress of mining and at the same time maintain a fixed transfer point through a fixed tripper and is extendable to 600 or 700 feet.

As the working face advances, the Shuttle Conveyor can closely follow the mining machine and receive its load either directly or from an intermediate transportation unit such as shuttle car or loading machine. The Shuttle Conveyor is so designed that alignment can be properly maintained by mounting small guide rollers on standard roof-jacks along each side of the conveyor frame, when operating off-track. When track-mounted, the guides are not required.

Remember, when it comes to any type of belt conveyor or complete belt conveyor systems, only one company—Hewitt-Robins—can assume single and unified responsibility for successful operation. For only Hewitt-Robins designs, engineers, manufactures and installs both the belt and machinery.

Here is a partial list of

HEWITT-ROBINS PRODUCTS

that will help you cut handling costs and increase operating efficiency.

MACHINERY

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

INDUSTRIAL RUBBER PRODUCTS

BELTING:

Conveyor Elevator Transmission

HOSE

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For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your

1875

INCORPORATED

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AN ALLIS-CHALMERS REPORT

How hydraulic torque converter drive improves big tractor performance—increases job output

With a two-range transmission and hydraulic torque converter, the Allis-Chalmers HD-20 is the only crawler tractor that is capable of exerting maximum drawbar pull at all times . . . under all load and terrain conditions . . . without gear-shift guesswork.

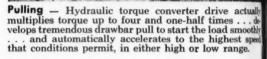
Whatever the job, the operator need merely make contact with the load and then open the throttle. As the load requirements change, the hydraulic torque converter *automatically* matches the conditions with exactly the right combination of speed and pull.

This eliminates most shifting...leads to far more work done in a continuous work cycle... far longer equipment life.

Hydraulic torque converter drive, exclusive as standard equipment with Allis-Chalmers, is just one of many reasons why the HD-20 assures you higher output with less upkeep. Your nearby Allis-Chalmers dealer invites you to get the full story... and to see it in action.

WEIGHT - 41,000 LB. • 175 NET HP. AT FLYWHEEL

ALLIS-CHALMERS
TRACTOR DIVISION - MILWAUKEE 1, U. S. A.





Pushing — Operator just makes contact, then opens the throttle and relaxes. The HD-20 automatically matches speed to that of pushed equipment, maintains steady contact while loading, sends load off to the fill at higher speed.

Digging and Loading — With the HD-20G, the operator crowds surely and steadily, using only throttle and bucket levers. With full horsepower always available even at creeping speed, he can work effectively in much on hillsides or edges of banks.



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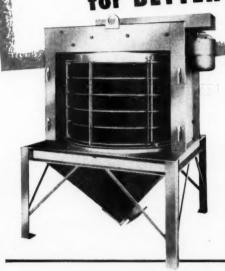
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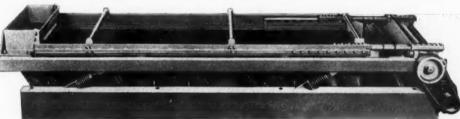
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 6 " " (10 H.P.)
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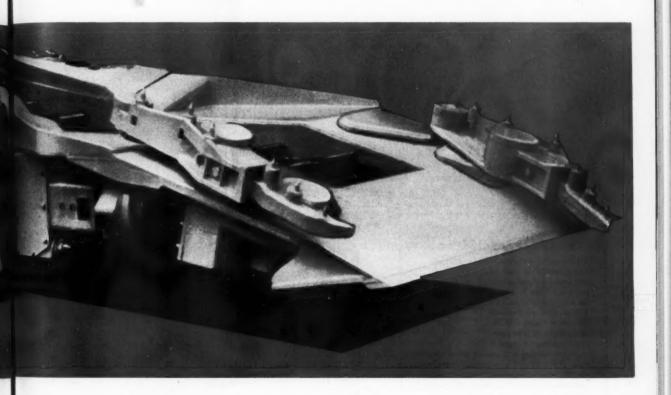
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This new Jeffrey Crawler-Loader is the culmination of years of experience in designing and building dependable, high-production Loading Machines. Here's a sturdy, mobile Loader designed and developed for heavy-duty service and low-cost production.

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Experience . . Jeffrey know-how and Jeffrey plant facilities provide ample assurance that this Loader will prove a good investment . . both from the standpoint of low maintenance and productive capacity.

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ADVANTAGE OF ENGINEERED HEAD

- 1—Designed to support a place washer hading a round hole large enough to store the expansion shell without removing the shell from the bolt.
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- -Assures a good thread fit between the bolt and shell.
- -No lost parts.
- 5-A definite saving on installation time.

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- 1-Double expansion means double holding power.
- 2-A 3-inch parallel contact with the hole.
- 3-No definite drilling depth required.
- 4-Shell can be anchored solidly any place in the hole.
- 5-Will not turn while being tightened.
- 6-No loss of parts as wedge and shell are locked together.
- 7-No special nuts or ears are required on the bolts.
- 8-Anchors equally well in hard or soft roof.
- 9-Wedge supports the entire length of the outer shell.
- 10-Tests indicate that the shell will not fail under a 20-ton pull.

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Available in 1/4" Steel Specs. (A.I.S.I. C-1040) and 3/4" (A.I.S.I. C-1025) Regular Square Heads available if de-



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When Pattin Bolts and Shells are shipped assembled, a protective tube is slipped over the shell to protect the bolt threads and the shell in transit and handling.

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get more footage per man-shift with CRUCIBLE CA DOUBLE DIAMOND Alloy Hollow Drill Rods

Tungsten-carbide bits and heavy-duty rock drills have made deep-hole drilling possible. But just as important are the sectional steel rods that go between.

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Each lot of *CA Double Diamond* is thoroughly tested by actual granite drilling. And each rod possesses a uniformly round, accurate hole that permits maximum water or air passage . . . an essential in successful long hole drilling.

For longer drill life and lower operating costs on your next long hole job, specify Crucible *CA Double Diamond* Alloy Hollow Drill Rods.

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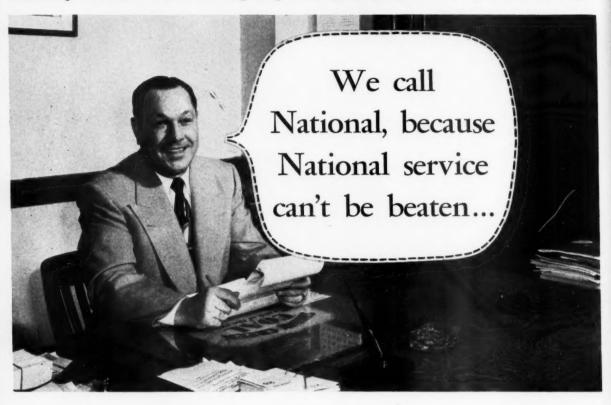
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REX HIGH SPEED . TOOL . REZISTAL STAINLESS . ALLOY . MAX-EL . SPECIAL PURPOSE STEELS

what happens when electrical failure ties up production at The Sunday Creek Coal Company? Purchasing Agent E. H. Robinson says:



"... I've been doing business with National for 25 years, and I've never found an organization more interested in giving its customers the best possible service."

Fast, reliable service has been a National byword since the company was organized in Bluefield, West Virginia, in 1917. Today, in addition to the main plant in Columbus, National operates plants in Bluefield, and in Harlan, Kentucky. These two are located and equipped especially for service to National's coal field customers.

"We do all of our own electrical repairs, but

we've been able to reduce our coil inventory from \$20,000 to almost nothing because we know we can rely on National for fast delivery of the windings we need."

And if you don't do your own motor repair and maintenance, you'll find that the speed with which National services and returns your equipment will cut your costs by letting you reduce your inventory of stand-by motors.

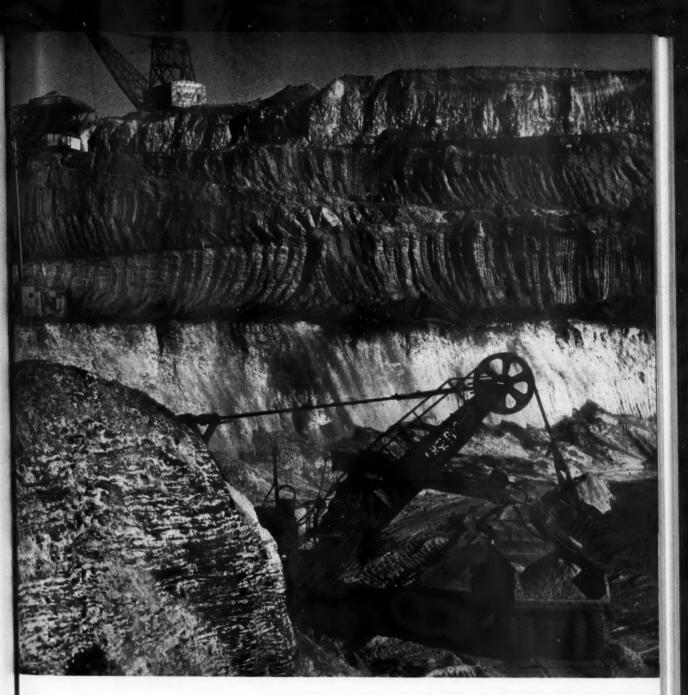
It will pay you to get better acquainted with your nearby National field engineer. If you don't know him, drop a line to the nearest National plant and ask for his name.

NATIONAL FLECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.



ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES



IMPOSSIBLE WITHOUT EXPLOSIVES

120 million tons of iron ore, it is estimated, were mined in open pits and underground operations last year. This photograph shows some of the highly mechanized operations which make such huge production possible.

But before the ore can be dug, millions of pounds of explosives are used to break it loose from working faces, to assure easy shovel digging and rapid

transportation of the ore to the crushing and washing plants.

The manufacture of explosives and the knowledge of their efficient and economical use have been Hercules business for 40 years. During this time we have studied the varying conditions under which explosives are used and have pioneered in developing the right types of explosives for industrial needs. Hercules explosives and services assure economical and efficient blasting not only in metal mining, but in coal mining, quarrying, construction—in fact, wherever explosives are used.

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92 net hp-key to profit



This LS-85 loads out crude ore for the Haystack Mountain Development Co. near Grants, N. M. Its operator reports, "... practically no maintenance is required."

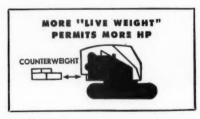
This rock-busting LS-85 not only delivers more net hp . . . it's built to handle it!

NET delivered hp—not engine model alone—determines how fast and easy your digging goes. More net hp speeds digging, minimizes stalling, assures smoother, hitchless swings. The heavy-duty Link-Belt Speeder LS-85 with diesel engine delivers more net hp than any other 3/4-yd. rig.

But that's only half the story. The LS-85 is *not* overpowered. All-welded stress-relieved construction and more *live weight*, permit continuous operation, under full power without premature clutch, structural or transmission trouble.

Get the facts on the LS-85 now. Ask your distributor or write for catalog No. 2317.

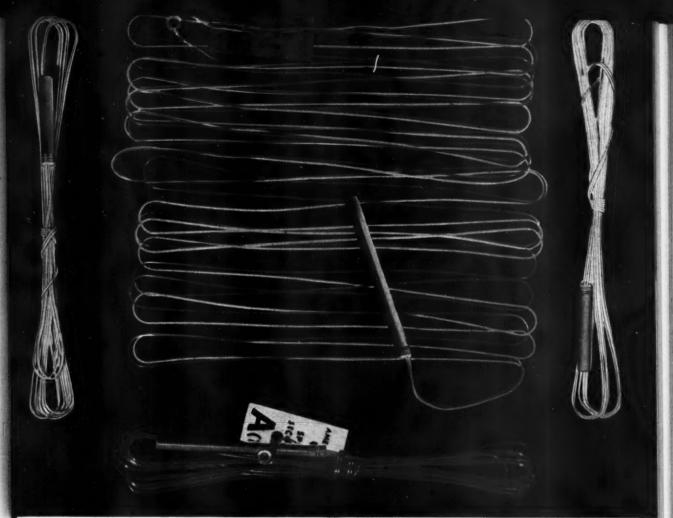
LINK-BELT SPEEDER CORPORATION 13,394
Cedar Rapids, lowa



COMPARE shovel-cranes with and without counterweight. That test spotlights the size, weight and heft built into the working parts and structural members. You'll find the LS-85 has more "live weight" than comparable \(\frac{3}{4}\)-yd. machines.

BUILDERS OF A COMPLETE LINE OF CRAWLER, TRUCK AND WHEEL-MOUNTED SHOVEL-CRANES

LINKBELT SPEEDER



Now available! Superior insulation featured in new Cyanamid blasting caps



Cyanamid has for many years been conducting a study of all materials available for blasting cap wire insulation to find one that would offer uniform concentricity—no thin spots. Every type of insulation currently in use has been tested, as have many new materials. Now Cyanamid has an insulation that gives uniform concentricity, assures maximum performance!

This new, organosol plastic insulation is applied to wire by a continuous bath method. The wire is dipped in seven separate baths and is passed through dies to scrape off excess coating between baths.

Color-Coded for Easy, Sure Identification









Standard Delay



Each coat is heated to insure perfect set, perfect concentricity. Organosol plastic insulation, because of its uniformity, gives you:

- Greater electrical insulation values
- Greater abrasion resistance
 Non-porosity
- 2. Greater flexibility
- 5. Greater moisture resistance

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easy cutting
with
KENNAMETAL*

At a large colliery in West Virginia, one set of Kennametal U8R3 Bits cut 1440 30-ft. places at a bit cost of only \$.0013 per ton. Previous costs here had been reasonable because of relatively easy cutting conditions, yet use of tough Kennametal Bits not only reduced these costs, but produced better coal, with less dust.

Controller repair costs are down 50%... power consumption is 15% less... cutting time per place has been reduced by 20 minutes... cuttings are coarser—there is more pea coal.

Kennametal Bits — the economical answer to severe cutting problems — can also effect extra savings in ordinary cutting conditions because they stay sharp longer, take harder knocks than any other tungsten carbide. Your Kennametal Representative would like to go into your mine and demonstrate. Call him anytime.



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* Registered Trade-Mark

KENNAMETAL INC. MINING TOOL DIVISION

BEDFORD, PA.

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World's Largest Manufacturer of Tungsten-Carbide

Drill Bits, Cutter Bits, Roof Bits, Strip Bits

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because WHEAT gives you **EVERYTHING YOU WANT in** modern electric cap lamps



Less investment and lower operating costimmediate savings



Automatic charging-no manual attention



More light throughout the shift-right through the last hour



Continuous top-level efficiency—always as bright as new



High level output without excessive weight or bulk-weighs only 80 ounces



Auxiliary bulb-never a blackout



No burns from electrolyte-no re-solutioning

National Mine Service Company

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N ACTION! MARION 4161

"Smooth — fast — lots of life." These are comments of operators on a fleet of seven MARION 4161 shovels in an eastern mine.

They could add "dependable—powerful and economical" too, for the 4161 is famous for these qualities in the world's hardest digging.

The strength designed and built into the 4161 is matched by its Ward-Leonard Elec-

tric power. With Amplidyne or Rototrol controls, it has small-machine speed with bigmachine output. Protection against overload is automatic.

You can pay more, you can pay less, but you can't buy more machine value anywhere if you need production, dependability and low-cost operation in hard digging. Ask for Bulletin 394.

MARION

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MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES



from 3/4 cu. yd. to 45 cu. yds.



AT WHITE PINE COPPER MINE-

RELIANCE MOTORS PROVE DEPENDABILITY HAULING ORE UP TOUGH GRADES

The rugged Reliance D-c. Motors that power the 12-ton shuttle cars at White Pine Copper Mine, White Pine, Michigan, prove over and over again that Reliance builds "The Toughest Motors Ever Built". Twenty-four hours a day, these motors take their heavy loads over wet, mucky haulage ways, up a long 10% grade to the portal. And outdoors, in all kinds of weather, up another grade, this time 13%, to the storage pile. On the return trip, these same motors provide dynamic braking for sure control on the downgrade.

This is one more example of the way Reliance provides the right combination of dependable equipment . . . plus skillful application of that equipment . . . to get maximum results. For prompt, capable assistance with any electric motor problem, call your nearby Reliance Sales Office . . . or write us direct.



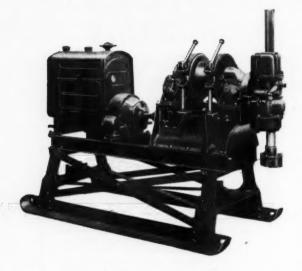
"THE TOUGHEST MOTORS EVER BUILT" Reliance Protected Open Type 'T' Heavy-Duty Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from 3/4 to 1000 hp., for constant or adjustable speeds, with shunt, series, or compound windings. For details, request Bulletin C-2001.

RELIANCE

ELECTRIC AND ENGINEERING CO.

1116 Ivanhae Road, Cleveland 10, Ohio . Sales Representatives in Principal Cities





Whether you're mineral prospecting or looking for extensions of existing deposits, you'll wind up with the right information easier and faster by using the skid mounted CP-8 and CP-15 Diamond Core Drills. Specifically engineered to withstand the continued high drilling speeds made possible by bortz bits, they're available with gas, diesel or electric drive for surface drilling and air drive for sampling underground. And they can be readily moved from hole to hole under their own power. Bolted frame permits easy disassembly for transportation to remote sites. With E-EX fittings the CP-8 has capacities to 1250 ft., the CP-15 to 2250 ft. For more complete information, write: Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N.Y.

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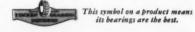
How 64 TIMKEN® bearings in a continuous "Miner" help keep it that way

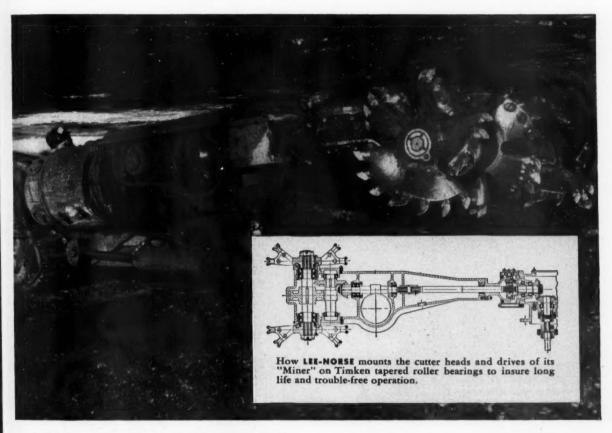
HIS LEE-NORSE continuous "Miner" stays on the job day in, day out with minimum time-out for repairs. The 64 Timken® tapered roller bearings help make sure of that.

The heavy shock loads set up by high speed cutting are handled with ease by Timken bearings. Rollers and races of Timken bearings are case-hardened to give them tough, shock-resistant cores and hard. wear-resistant surfaces. And line contact gives Timken bearings extra load-carrying capacity.

Particularly important for mining machines, working under a constant stream of coal, are effective closures. Timken bearings help make closures more effective by holding housings and shafts concentric. Lubricant stays in-dirt and coal dust stay out. Maintenance costs are cut.

Timken bearings give you more advantages than any other bearing. Be sure to specify them in the equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".







HARD ON THE OUTSIDE, TOUGH ON THE INSIDE

Rollers and races of Timken bearings are case-carburized to give a hard, wear-resisting surface and a tough, shock-resisting core. Result: longer bearing life.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. spe-cial analysis Timken steels.



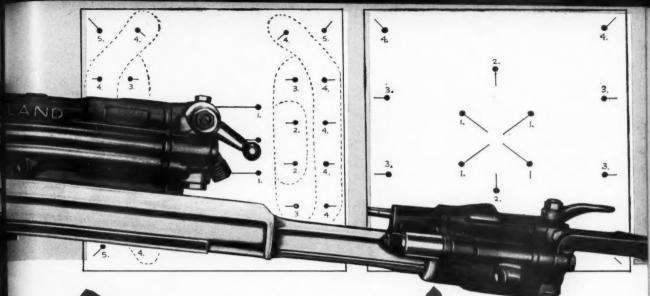
TAPERED ROLLER BEARINGS



NOT JUST A BALL ONOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL DAND THRUST -D-LOADS OR ANY COMBINATION







Any round goes faster!

— with Le Roi-CLEVELAND Drifters and aluminum guide shells for 4' or 5' steel changes

No matter what pattern they use, your miners drill out the round faster with Le Roi-CLEVELAND Drifters.

It's easy to see why: Le Roi-CLEVELAND Drifters are easier to handle. And they have high drilling speed — plenty of rotation power — a wide selection of steel changes. In short, Le Roi-CLEVELAND Drifters have what it takes to drill more feet of hole per shift.

And - since they help raise your tonnages, they help

cut your costs, too. That's because they use air economically — and because they're built "tough" to stay underground where they can do you the most good.

Yes, sir, Le Roi-CLEVELAND Drifters are "just what the doctor ordered," to speed up your drilling cycles, increase your footage, and lower your drilling costs. Ask your Le Roi representative for the whole story.

Write for free Bulletin No. RD25.



CLEVELAND ROCK DRILL DIVISION

Le Roi Company

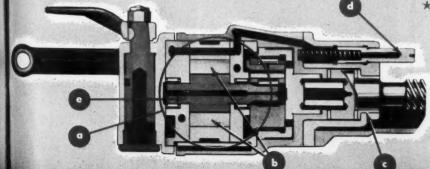
A Subsidiary of Westinghouse Air Brake Co.

12500 BEREA ROAD . CLEVELAND 11, OHIO . Plants: Milwaukee, Cleveland and Greenwich, Ohio

Advantages of Le Roi-CLEVELAND Power Feed

* Faster steel changes!

* Constant rate of drilling!



* Reduced operator fatigue!

* More footage per shift!

- G. Motor proper is vane-driven, double-lobe type. Power is applied at diametrically opposite points of rotor — for better feeding action, more constant tarque.
- Vane-type design provides fast, positive feeding — uses little air.
- C. Floating-joint construction and thrust washers absorb shocks, reduce upkeep.
- d. Exclusive automatic shut-off valve prevents drifter from hitting feed motor, when changing steels.
- One-piece rotor is carried on roller bearings at both ends. The three intermediate gears also operate on roller bearings.



TOP: Model F-113 "Turbinair". Compact, simple design with motor inside the drum. Direct power transmission from motor to drum assures maximum efficiency. Simple, accessible controls make operation easy.

RIGHT: Model DW-111 "Pistonair". Features reversible power with light weight. Four-cylinder, 3½ h.p., reversible motor will handle up to 1200 lbs.

FAR RIGHT: Model L-111 "Pistonair". For heavy hoisting jobs. 7½ h.p., reversible, five-cylinder motor for loads up to 2000 lbs.

OVER 100 YEARS OF ENGINEERING LEADERSHIP

Joy L-111 reversible "Pissonair" Single Drum Hoist operating in a magnetite iron mine in the Adirondack region of New York. Joy E-112 "Turbinair" lifting timbers in a raise in a western mine. The extra rope capacity of the E-112 (450' of %" rope) makes it applicable to say of the utility hoisting needs in this mine.

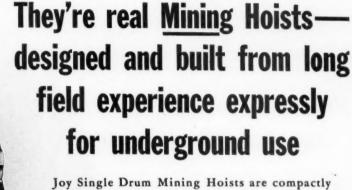
Joy AW-80 Air Winch hoisting timbers into in a drift in a Canadian mine. At a weight of 85 lbs., this unit will lift 500 lbs.







SINGLE DRUM HOISTS



designed, of modern, high-strength alloy metals, for lighter weight with greater power and efficiency.

The complete Joy line includes the "Turbinair" series which develop maximum horsepower per unit of weight; the "Pistonair" with reversible four or five cylinder motors; and compact, rugged electric-powered models which feature space-saving short-length external motors.

Joy Single Drum Hoists are built with lifting capacities ranging from 500 to 3500 lbs., and rope capacities from 150 to 1500 ft. "Pistonair" models have a positive acting safety brake which holds the load in any position when the throttle valve is "off."

Joy also manufactures a complete line of Shaft Hoists, and Two- and Three-Drum Slusher Hoists in capacities to handle all hoisting and scraping needs.

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Have you seen this film?

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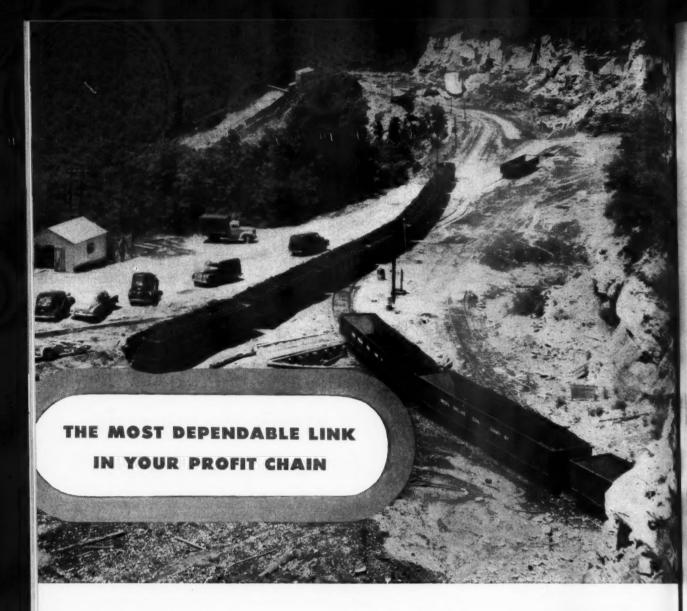
Write for Bulletin, or . . .

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IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



To show a healthy profit every link in the chain of production must operate with top efficiency. Today, more and more mine operators depend on Q.C.f. Drop Bottom cars to maintain that efficiency. Able to dump a 30 ton load "on the run" in just 5 seconds, the simple design of these cars also makes on-the-spot repairs possible with no slowdown in production.

Used to fill four 75-ton bins in the first step of preparation at Hampton Mines, Westmoreland

Coal Company, Q.C.f. Drop Bottom cars have helped set production records for nearly 4 years. Deep mine operators save even more money by using Q.C.f. Mine cars to serve a dual purpose—to take men and materials in—bring coal out.

Whatever your mining problem it will pay off in profits for you to get the facts from your Q.C.f. Representative now. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland · Philadelphia · Huntington, W. Va. · San Francisco · Washington · Berwick, Pa.

Q,C,f, MINE CARS
for Constant Haulage

Goodman MOBILE LOADERS AND SHUTTLE CARS

Goodman swing-motion loaders have matchless advantages in any condition of mining:

- Loading head swings to either side for wide path loading-effects good cleanup in corners, along rib and around posting
- · Discharge swing allows quick and easy positioning over shuttle car or conveyor
- Combined swing of loading head and discharge end assures maximum recovery when pulling pillars—permits driving crosscuts at 90° angles in narrow work, without double handling of coal

Tramming heights: 261/2", 33", 361/2" and 411/2"



20482

Combination Underground Puts Record Tonnages On Top

Goodman shuttle cars are noted for:

- adequate capacity to receive surge loads
- speed to effect quick-trip transfer of loads
- maneuvering ability to accelerate productive work
- performance that promotes continuous, uninterrupted service

Basic heights-26", 32", 34", 42", 48"; 4-wheel drive; 4-wheel steer; fixed and elevating discharge



It will pay you to investigate this working combination that delivers profitable performance between face and haulage system. See your Goodman salesman.

TURING COMPANY Chicago 9, Illinois Halsted Street

Cutting Machines

Conveyors

Loaders

Shuttle Cars

Locomotives

Continuous Miners

ALLIS-CHALMERS MOTOR SCRAPERS

FULL CONTROL makes

TS-300 IN ACTION

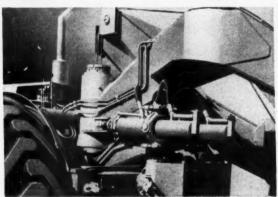
14 cu. yd. struck capacity 18 cu. yd. heaped capacity 280 hp. Buda diesel or 275 hp. Cummins diesel

the difference

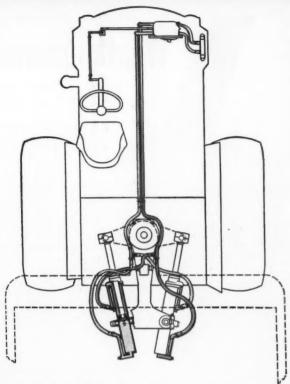
The full control built into Allis-Chalmers *Motor Scrapers* offers you a real advantage. There's no tiring wheel fight for the operator . . . no straining to see what he's doing. What's more, full control creates greater confidence when he's highballing a full load. He can work at his best all day long easily and safely. That means moving *more* dirt *faster* and at a lower cost.



One Hand Does the Steering—the other handles the scraper controls. Fast action makes loading easy. The operator can utilize hydraulic power of steering jacks to pull through soft spots in haulways under extreme conditions.



No Weaving—No Road Shock — Hydraulic system is locked and the *Motor Scraper* becomes a rigid 4-wheel unit except when steering wheel is turned, thus eliminating transmission of road shock to steering wheel. Low-mounted rams, close to load line pull, mean minimum stress on the kingpin.



Easy, Fast-Action Steering — Schematic layout shows simple double-action steering system. Slightest movement of wheel opens valve of gear-type pump; release wheel and valve automatically returns to "hold." Only a one-third turn of steering wheel is necessary for a full swing of the tractor.



Excellent Operator Visibility — Clean design of low gooseneck connection gives operator unequalled view of cutting edge, helps him cut cleanly, efficiently...load fast and full.

Your nearby Allis-Chalmers dealer will be glad to show you and give you the full story on these job-proved *Motor Scrapers*. See them at work.

PLLIS-CHALMERS

What's unusual about this machine?

There are 265 wires in this particular rope construction. That means 265 individual moving parts.

The 8 different sizes of wire are all drawn to precise diameters. Each wire is protected with lubricant applied during fabrication of the rope.

Macwhyte makes a thousand and one ropes to meet the needs of every type of equipment. Each is built with the exacting care that long, low-cost service demands. Prompt recommendations on request.

GET THE RIGHT ROPE FOR YOUR MINING EQUIPMENT

MACWHYTE WIRE

MACWINYTE

Ask For G-15 Handbook

104

Macwhyte 6 x 36 WS PREformed Right Lang Lay Monarch Whyte Strand with IWRC.

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JACKDRILL FEATURES

that add up to

MORE TONNAGE PER SHIFT!



951.5

The advantages of a Jackleg type of drill are now so well established that you should buy the best available design for the job. Collectively the Ingersoll-Rand JR-38 Jackdrill design features make it the fastest drilling, easiest handling oneman drifter unit ever developed.

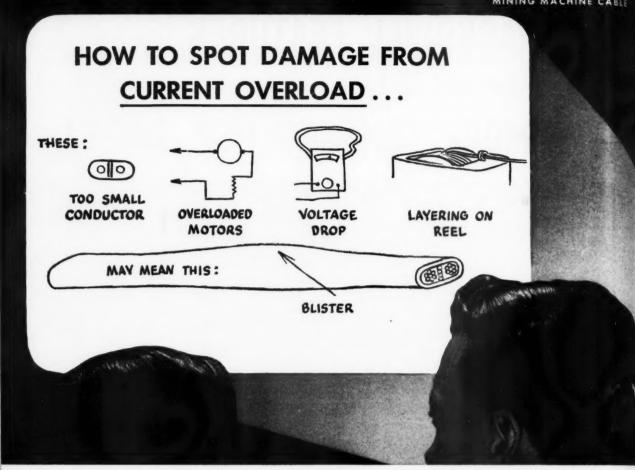
The JR-38 is not a Jackhamer-Jackleg combination but a completely integrated Jackleg Drill-

designed to take full advantage of faster, easierdrilling Carset Jackbits. Use it as a drifter—as a stoper—as a Jackhamer. Its flexibility, ease of handling and simplicity of control pleases owners and operators alike.

Ask your Ingersoll-Rand representative for complete information on the new JR-38. Or write for your copy of Bulletin 4144.

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COMPRESSORS . AIR TOOLS . ROCK DRILLS . TURBO BLOWERS . CONDENSERS . CENTRIFUGAL PUMPS . DIESEL AND GAS ENGINES



... AND WHY THERE'S GREATER HEAT STAMINA IN ANACONDA'S NEW MINING MACHINE CABLE

Blisters, formed by gases from overheated insulation, are a sure sign of cable overloading. A torn cable may result. Since you can't always control overloads, it's important to choose quality cable.

Today, due to better design, jackets and insulation, good cables shouldn't cook on the reel the way they used to. But this only makes overloads harder to detect. They still may be present . . . caused by too small a conductor, overloaded machines, voltage drop or even layering of the cable. With 4 layers on the reel, according to I.P.C.E.A., unventilated bottom layers lose 65% of capacity.

WHY THE NEW ANACONDA CABLES ARE SAFER

First, they are more flame-resistant. Jacket is made from a new neoprene formula. Improved cold-rubber insulation gives greater heat stamina. Patented breaker strip* insures a safer ground. No ANACONDA Cable has ever failed a U. S. Bureau of Mines flame-test!

CABLE LIFE NOW MUCH LONGER

In 15 mines recently surveyed, ANACONDA Cables on shuttle cars are lasting up to 300% longer than cables made only a few years ago. Together, jacket and insulation protect these cables better - especially in wet mines where sliver-cuts can cause shocks. The cables are tougher. New-type stranding flexes better under tension.

All this means economy because one break in cheap cable costs more than you can save by buying on price. For a sample of this new cable, call your Anaconda Sales Office or Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 53302

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TODAY'S HEADQUARTERS FOR MINE CABLE

*U. S. Patent No. 2.455.778













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GARDNER-DENVER announces . . .

two new lightweight

One-Man Air-Leg Drills

only 79 pounds the 21/2" model FL 48 new convenient controls quickly respond.

new handling ease increases productivity.

new versatility

for up holes, down holes, drifting, stoping, slashing.

Built to stay underground. Write for full details.

only 87 pounds the 2%" model FL 58

SINCE 1859

















THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

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YOU CAN SAVE UP TO 254 PER TON WITH

OSMOSE

TREATED MINE TIMBERS

This may sound like a sucker bet, but don't take the guy up on it because we can PROVE IT in one year. Here's how YOU CAN WIN the \$50,000! If you deep-mine 200,000 tons of coal annually, YOU can save your company 25¢ per ton or \$50,000 per year by switching to OSMOSE TREATED MINE TIMBERS NOW!

Whether you buy them from us or treat them yourself with our materials, Osmose Treated Mine Timbers are impervious to all types of rot, decay and termites and LAST UP TO FIVE TIMES LONGER! Mine timbers are EXPENSIVE today, but when you compare this cost with the cost of REPLACEMENT LABOR, you begin to see why Osmose can save you such a tremendous amount. Comparable savings are possible for larger or smaller tonnages. We are VETERANS in the coal mining field and have been specialists in Mine Timber problems for years! Successful coal operators everywhere will be glad to tell you that for long range EFFECTIVENESS and real ECONOMY... you can't beat Osmose Treated Mine Timbers.

ALSO ... Ask us about M-T-M (Mine Timber Mix) for spot application.

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DO THE NATION'S LEADING
COAL MINING COMPANIES USE
OSMOSE Treated TIMBERS?

Here's the report from: POCAHONTAS FUEL COMPANY, INC. "Our Company has been using Osmose timber treatment, at the various mines, since 1942. We feel that sufficient time has now elapsed to prove the worth of your treatment, and are pleased to advise that it has been very satisfactory to us."

WRITE FOR COMPLETE DETAILS on the type of Comese service you prefer

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AT Bessemer Limestone & Cement Co., Bessemer, Pa., one McCarthy unit (above) averages 90 ft. per hour, drilling through hard blue shale and sand rock 34 ft. deep. Blast holes are drilled on 18-ft. centers. Two men handle the whole job, including setup and moving. McCarthy drills operate with gasoline, diesel or electric power units... on all types of mounts. McCarthy "money-savers" can work for you. See your nearby distributor or write Salem Tool direct for further information.



Blownt DETA

Bench Type Grinder
(Pan dimensions—35" x 26" x 4½")

BIT GRINDERS

BENCH and FLOOR TYPES
Electric. Air or Gasoline Driven

Floor Type Grinder
(Over-all height—55", floor space—36" x 31")



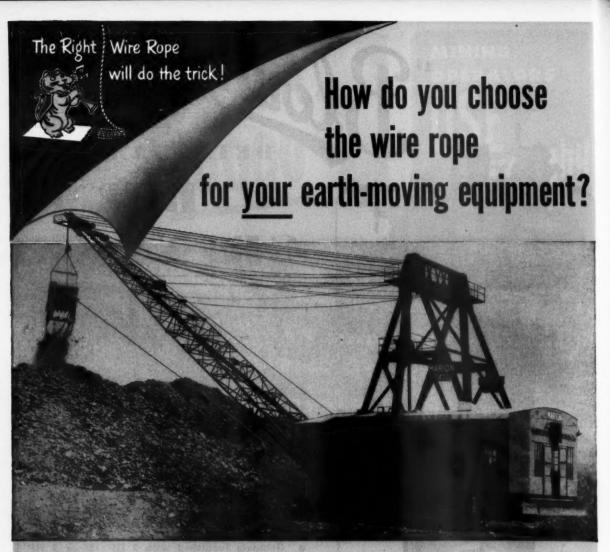
Let Blount Grinders solve your bit grinding problems. Whatever type of detachable bits you're using. Blount can furnish just the right equipment to keep your bits in shape—for improved drilling performance and longer life.

Full information on request—no obligation. All you have to do is to advise the type and make of bits to be sharpened, and the type of drive desired.

- Grinders furnished with 2 HP 12" or 3 HP 14" diameter wheels, 11/4" arbor.
- Equipped with Timken tapered roller bearings.
- Furnished complete with fluting, gauging and form wheel dresser fixtures of improved design (wear and water resistant).
- Equipped with 1¼" wide regular form and gauging wheels for grinding regular steel bits.
- Special type wheels furnished for grinding carbide tipped bits.
- Coolant tank and circulating pump furnished with floor type grinders.
- · Starting switch with motor protection.

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Every wire rope on your stripping or excavating machinery needs a particular combination of strength, fatigue resistance, and flexibility. Hoist ropes on big power shovels need high tensile strength to absorb impact stresses and must be extremely tough to withstand constant bending over sheaves. On draglines, drag ropes must possess high strength combined with great abrasion resistance. Boom ropes must have strength plus fatigue resistance.

There's an American Tiger Brand Wire Rope that has been especially designed for every grueling rope job that you will encounter. And it pays to spend a little extra time to analyze your rope requirements carefully and determine exactly which'

Tiger Brand Rope is the best one to use.

Our experienced Wire Rope Engineers will be glad to help you do this. They know what every Tiger Brand Rope can do and what type of rope every job requires. Their assistance assures you of getting the right rope for every job; and that saves you money. Remember, the right rope often lasts up to twice as long as the wrong one. Free engineering service is available through our nearest District Sales Office or by writing to American Steel & Wire, Rockefeller Building, Cleveland 13, Ohio.

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Excellay Preformed



UNITED STATES STEEL



Published for the Entire Mining Industry

by the American Mining Congress JOHN C. FOX. Editor

FEBRUARY

VOLUME 40

1954

NUMBER 2

Projecting the Record

THIS February issue of MINING CONGRESS JOURNAL is again given over to a review of the mineral industry. In it, prominent mining men look backward at the record and forward to the future to bring our readers the best informed opinion on the State of the Mineral Industry.

Only an impartial observer from some vantage point in time and space could truly identify the trends in an industry, and then only after the event. Extrapolation beyond experimental limits is always a risky business. However, progress is the product of those willing to look ahead, to make estimates founded on all the facts at hand. Based on the reports in this issue, we see no valid cause for pessimistic thinking. On the contrary we feel our country and our industry are moving toward their greatest era.

Mining as a whole will increase over the years ahead—perhaps not as rapidly as in the past, but the production trend is definitely upward. Responsible authorities are predicting a U. S. demand for more than a billion tons of coal by 1970, and metal consumption by that time of twice what it is today.

Already the metal and nonmetallic mining industries are committed to investments for expansion totaling an estimated two billion dollars. Projects scheduled for completion in the next few years include the developing and equipping of new mines and mills and the modernizing of older plants.

The coal industry, too, is installing new laborsaving machinery and projecting many plant improvements. Competition with other fuels and within the industry itself is the immediate spur driving coal mining forward, though here too there is an air of preparing for an enlarged future.

In every branch of the mineral industry operators are accelerating the design and introduction of newer, more efficient methods and equipment. They are exercising greater ingenuity in the application of standard tools and treatment processes. Everywhere a determined effort is being made to up production and lower its cost.

The manufacturers and suppliers to the mining industry are coming up with new equipment, reflecting the trend toward more efficient surface and underground mining. Mechanization proceeds on an ever faster scale, lightening man's physical burdens, increasing his productivity and making his work more safe.

From small beginnings, research in exploration, mining methods and treatment processes is burgeoning rapidly. Although the portion of the sales dollar spent in research is still small, it will increase. It must, if we are to: first, find and develop new deposits; second, mine them economically once they are found; and third, make the most efficient use of the fuels, metals, or minerals they contain.

But with all this optimism for the future, the industry is faced with problems of deep present concern. Prominent among these are the excessive imports of low grade fuel oil, of lead and zine, and of other minerals. In 1953 the industry and those Congressmen and Senators who recognize the importance to the welfare of our country, in peace or in war of a healthy, going mining industry, fought valiantly to place domestic production on a competitive basis with imports from foreign countries.

In the present session of Congress they will again take up the cudgels to assure some measure of protection to this vital segment of our economy.

For the years ahead, the long-range outlook for all mining is bright. There will be a change in emphasis in coal's markets. Electrical utilities use more solid fuel each year and will continue to do so. The steel industry puts in a ton of coal for each ton of iron ore in the furnace; increased steel output, therefore requires more coal. The cement industry, setting new records every year, uses yast amounts.

Expansion of light metal production—aluminum, magnesium, titanium—also requires great quantities of coal. Its use as an industrial raw material in manufacture of chemical products, plastics, oil, gas, etc., is just beginning. There are many who predict that such use may eventually outstrip all coal's other markets. The industry has scarcely begun to realize its future as supplier of electrical energy on the one hand and of industrial and chemical raw material on the other.

Just as coal stands on the threshold of a new and greater era so do the metals and nonmetallics. Our growing population will require more and more of the familiar metals and minerals to feed and house itself. With improved techniques in both extraction and utilization, these metals and minerals and many less commonly used now have tremendous possibilities. Industry will employ the earth's elements in new ways to form new metal alloys, chemical fertilizers and other new materials. As a result, we shall have improved tools and machinery, more houses and buildings, better roads, more and better food and atomic fission devoted to peacetime uses—these spell a better tomorrow for us all.

To meet these long-range needs of our country, American mining will continue to extend its horizons; anticipate the new demands of our expanding economy, and meet them as they arise—come what may.

Annual MINING REVIEW

• Underground Metal Mining Progress is described in an article beginning on page 44 by KOEHLER STOUT, assistant professor of Mining Engineering, Montana School of Mines. Mr. Stout has worked as a miner, a mine lessee, production engineer, shift boss, shift foreman and mine captain in addition to teaching and knows well the subject about which he writes. He has been assistant professor of Mining Engineering at the Montana School of Mines since September, 1952.



• On page 47 EMORY C. OLSEN, supervisor, Mine Inspection, Coal Mines and Quarries, Columbia-Geneva Steel Division, U. S. Steel Corp., reports on mining safety during 1953. Mr. Olsen has been associated with mining in the west since he left St. Edwards College 29 years ago. For the last 10 years he has been at the Columbia and Geneva Coal Mines near Price, Utah.



Potash and Phosphate are reviewed by THOMAS M. WARE in an article beginning on page 50. After being discharged from the U. S. Navy following World War II. Mr. Ware joined International Minerals and Chemical Corp. In 1949 he was made chief engineer and since June, 1952, has also been vice-president in charge of the Engineering Division.

• NATHANIEL ARBITER reviews Advances in Mineral Engineering in an article beginning on page 54. Now associate professor. Division of Mineral Engineering. School of Mines. Columbia University. Mr. Arbiter served as research metallurgist with Phelps Dodge Corp. and on the staff of Battelle Memorial Institute before joining the Faculty at Columbia School of Mines.





. R. LAIRD AUCHMUTY and MILO W. SUMMERS of Eavenson. Auchmuty & Summers, Mining Engineers, have teamed up to review Mechanical Coal Mining in 1953. The article begins on page 57. Since 1924 Mr. Auchmuty (left) has worked with the consulting firm of which he became a member in 1937. He has had experience in most of the coal fields in the United States. In addition he has reported on coal properties in Turkey, Nova Scotia, Mexico, Germany and Poland. Mr. Summers (right) has been associated with the coal mining industry since 1922, when he started work in a survey party for the Crozer Land Association. Since that time he has had varied mine experience in the engineering and operating departments of several coal companies. Before becoming a partner in the firm of Egyenson, Auchmuty & Summers in 1953, he was general manager and vice-president of Westmoreland Coal Co.



Mining Congress Journal is proud to introduce the authors of the Annual Review Articles presented in this issue. The year just ended was a critical one and the mining industry is indebted to these men who have reported and analyzed its events.

(Continued on pages 42-43)

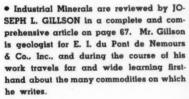
• W. W. DUECKER and E. W. EDDY again picture the sulphur industry's progress for our readers in an article on page 59. Dr. Duecker and Mr. Eddy are statisticians with Texas Gulf Sulphur Co. and have an intimate knowledge of the subject on which they write.



• Exploration Geology in Mining is the subject reviewed by ROBERT H. CARPENTER in an article on page 62. Mr. Carpenter is professor of Mining Geology at the Colorado School of Mines. He has had wide experience in exploration and has worked for the U. S. Geological Survey, Anaconda Copper Mining Co., International Smelting and Refining Co., and the New York & Honduras Rosario Mining Co. At present he is consulting geologist for the Molybdenum Corp. of America besides being on the staff of the Colorado School of Mines.



• J. B. MORROW reviews recent progress in coal preparation on page 65. Mr. Morrow is a member of the engineering consulting firm of Alford. Morrow and Associates. The early years of his career were spent with Phelps Dodge Corp. He was preparation manager of Pittsburgh Coal Co. from 1927 to 1929 and operating vice-president from 1929 to 1940 when he was made president. From 1945 until his retirement in 1951 he was a director of Pittsburgh Consolidation Coal Co.





• JOHN MITCHELL. director of research for Eastern Gas & Fuel Associates, and WILLIAM I. GLOWACKI, research chemical engineer for EG&FA, have joined their talents to review Coal Research during the year in an article on page 85. Mr. Mitchell (left) has had extensive experience in research on coal technology, especially in the fields of low temperature carbonization and briquetting. He is holder of approximately a dozen patents in coal, coke, and coal chemicals technology.

Before coming with his present company, Mr. Glowacki (right) was an Industrial Research Fellow for Koppers Co. at Mellon Institute in the fields of coal aromatics and fractional distillation. He is author of the chapter on Light Oil in "Chemistry of Coal Utilization."



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Review Authors

(Continued from page 41)

• New developments in iron ore mining are outlined by RICHARD W. WHITNEY, general manager of Minnesota mines for the M. A. Hanna Co. Mr. Whitney has been identified with iron mining since 1920. From his vantage point in Hibbing, Minn., he has followed the latest advances in iron mining and describes them in an article on page 82.



• Our review of Copper in 1953 was prepared by the very able HELENA M. MEYER and begins on page 90. Miss Meyer's government service began in the Geological Survey and since 1925 has been with the U. S. Bureau of Mines. She is author of numerous articles in the technical press and many commodity chapters of Minerals Yearbook. Currently she is the bureau's commodity specialist for copper and mercury as well as assistant chief of the Base Metals Branch.

• W. H. COOKE brings our readers up to date on the Coal Strip Mining Industry in an article on page 92. Mr. Cooke is president of the Little Sister Coal Corp. and also of the Illinois Coal Strippers Association. He has been very active within the coal industry. He was chairman of the Coal Industries Committee for Defense during the recent Korean fracas and has served as vice-president of the National Coal Association.



• C. E. SCHWAB is presently manager of industrial relations and in charge of the Block Caving section of Bunker Hill Mine. Prior to this he had both underground and open pit experience in Wisconsin, Michigan, Texas and Nevada. During the last year he has actively participated in the numerous hearings on lead and zinc. He draws on this phase of his work for the review of lead and zinc beginning on page 95.



e Much has been said and written about the state of the coal industry in recent months. W. A. FULLARTON. assistant to the president. Pocahontas Fuel Co.. Inc., tells exactly what happened in the industry during the year just passed in his review beginning on page 99. Since 1936, Mr. Fullarton has worked for coal trade associations, coal operators, in both executive and operating capacities, and in government agencies having to do with coal. Since May, 1953, he has been on his present assignment.



• W. H. YOUNG and R. L. ANDERSON bring our readers up to date on the sale of coal mine equipment during the year in an article beginning on page 112. Dr. Young (left) first joined the U. S. Bureau of Mines as an economist in the Coal Economics Division. Since 1944 he has served as chief of the Bituminous Coal Section.

Beginning his service in the mining industry with a firm of consulting mining engineers in 1923, R. L. Anderson (right) joined the Government in 1934. Since that time he has been employed by various agencies having to do with coal and at present is an engineer with the U. S. Bureau of Mines.





f c Anthracite is reviewed in an article beginning on page 106 by E. C. WEICHEL, vice-president of The Hudson Coal Co. Mr. Weichel draws upon his long experience in the industry to present α highly informative article.

 HON. PAT McCARRAN, Senator from Nevada, reports on Silver and Gold in an excellent article beginning on page 103.
 His complete familiarity with these topics makes him particularly well fitted to review them.



 Developments in aluminum during the year are reviewed on page 109 by WAL-TER L. RICE, president of Reynolds Mining Corp. which mines bauxite and fluorspar in the United States and foreign countries. Mr. Rice is also director, vice-president and general solicitor of Reynolds Metals Co. and president of Reynolds Jamaica Mines, Ltd., Tropical Steamship Co., Limited, and Caribbean Steamship Co.



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On page 116 THOMAS E. GILLINGHAM reviews uranium mining. Mr. Gillingham has had wide mining experience in South Dakota, Idaho, Canada and the Philippines. Since 1951 he has been with the Atomic Energy Commission in New York. At present he is chief of the Physical Exploration Section, Exploration Branch, Division of Raw Materials of AEC.

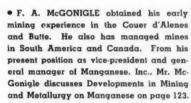


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• W. LUNSFORD LONG who is vice-president and general counsel for Haile Mines. Inc.. Tungsten Mining Corp. and Manganese, Inc. has been engaged in mining for the past 18 years. He was successful in the textile, mercantile, lumber and paper manufacturing businesses, and was outstanding in politics in North Carolina where he served several terms in the State Senate and was elected three times President Pro Tempore of the Legislature. His article on tungsten mercury, chrome and nickel appears on page 119.





• JAMES S. KIRKPATRICK is serving his second term as president of the Magnesium Association. He is also vice-president in charge of research and development of Brooks & Perkins, Inc., Detroit, Mich. He has a background of many years experience in working magnesium and in aircraft. He has served as an industrial engineer for Owens-Corning Fiberglass and was an engineering officer in the U. S. Navy Bureau of Aeronautics during World War II. His review of Magnesium in 1953 starts on page 126.





Trend in mechanized underground operations is toward larger size equipment with complete maneuverability

Underground Metal Mining Progress

Increased Mechanization Leading to Greater Efficiency in Mining Extends Ore Reserves

By KOEHLER STOUT

Assistant Professor Montana School of Mines

THE year was marked by intensive effort to maintain profitable operation in spite of rising costs and, in the case of certain metals, lower prices. Their attention focussed on more efficient operation, both equipment and methods were scrutinized by operators.

Air-leg drill use has increased the past year as more operators used this light, versatile type of drill to better advantage. Many mines ran experiments with air-leg drilling equipment and arrived at substantially the same conclusions. For example, Homestake Mining Co. reports more drill time per shift because of less set-up time, greater mobility because of the lighter weight, and less capital cost of equipment. In addition, when tungstencarbide bits are used, the air-leg is well adapted to drilling smaller diameter holes at greater speed. The mechanical design of the drill and the diameter of the hole combine to produce savings in air consumption. Powder used per foot of hole is also reduced. The over-all result is higher efficiency in tons per man shift.

Jumbos are being used to a great extent. For high-speed level driving or in room-and-pillar mining they have been holding their own with airleg competition. The trend in jumbo construction is toward self-propelled units mounted, where applicable, on rubber tires. For more efficient operation, many manufacturers are centralizing the controls on their units. Long-feed drills are being used on virtually all carriages, eliminating, or at least cutting down on, drill steel changes.

Operators of the Esmeralda mine in Parral, Chihuahua, Mex., are using a jumbo in their shrinkage stopes. They converted a Joy M-W-6 wagon drill carriage so that it will go up and down the 4 by 4-ft cribbed raises. They have used, with good success, both Ingersoll-Rand DA35 and Gardner-Denver CF89 drifters on this carriage. Climax Molybdenum Co. developed a jumbo that can be attached to their folding-type slusher bucket to reduce set-up time when drift headings are to be drilled.

Long-Hole Drilling Advances

Long-hole drilling for blasting is still making strides forward. Refinements in the combinations of tungsten carbide bits, detachable drill rods, and

special long-hole machines have been the reason for such strides. Gardner-Denver Co. has put on the market its SFH 99 drill, which has a 1½ by 3¹³/₁₆-in. shank rod locked in chuck, which they maintain results in longer life for hammer, tube, chuck, shank, rod, and ring seal.

The Belgians have reported a novel long-hole drill: the machine follows down the hole behind the bit. Although this has been used only in quarries, it may have some use in long-hole drilling underground if a suitable means of handling the dust is available. According to their report, they have drilled four-in. diameter holes 140 ft deep. To reduce the set-up time, a diamond drill was mounted on an air-leg at a Canadian mine, and the operators report it worked very well in holes up to 40 ft in depth.

Drill construction is being reviewed, with the lightweight aluminum and aluminum alloys being used for the push-legs and shells for drifters. It is not inconceivable that, in the future, many parts of the drill may be made of lightweight metals; such practice will further reduce the weight and consequently diminish operator fatigue. To be noted also is the trend to concentrate all controls on the machine in one handy and convenient location, and some attempts at streamlining have been made, the result of which reduces the machine projections. These projections are a potential source of injury to drill operators when working in tight places.

Drill Smaller Diameter Holes

Tungsten-carbide bit use is increasing, as they belong in combination with the lightweight drill to drill small-diameter holes. Some trouble has been experienced with insert and skirt failure on some detachable bits, but improvement of the insert bonding has contributed to longer life. Western Rock Bit Manufacturing Co.

has put out a tungsten-carbide-insert bit that can be used interchangeably on rods which are used for their regular one-use, press-on, throwaway bits. Some users of this type of bit assert that they have less bit skirt breakage than with other types. The trend, whether using tungsten carbide or steel bits, is to drill smaller-diameter holes in combination with the lightweight drills.

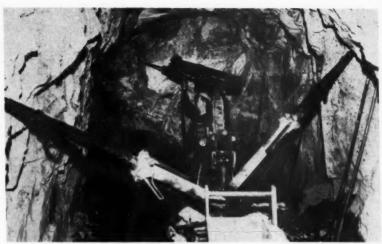
Many operators are experimenting with alloy steel drill rods. Some have reported favorable results, but others feel the added expense and the complicated heat-treating methods involved do neutralize any savings.

An interesting variation of longhole drilling has come out of Sweden, where operators use flat steel 12mm (approx. ½ in.) by 26mm (approx. one in.) with an integral tungsten carbide bit on one end to drill holes up to 50 ft deep and sometimes over. The steel is not coupled, but it is flexible enough to be bent in the level so that it can be placed in the hole.

In an effort to reduce loading time of rounds and long holes, many operators use powder packaged in sticks 16 and 24 in. long. This serves two purposes: the first, to cut down loading time; and, the second to space the powder charge properly in the hole to insure maximum explosive effectiveness.

The U. S. Bureau of Mines reported driving a raise at the Mount Weather experimental mine using no cut holes in the round and blasting with millisecond delays. The rounds generally broke to the bottom and averaged five ft in depth, but the Bureau found that by not using cut holes timber breakage was excessive.

The condenser type of blasting machine has proved very successful and some operators have gone back to electric blasting where they previously



Air jacks anchor jumbo in drift

experienced trouble with other types of blasting circuits or machines. Igniter cord is being used by some operators to light and time fused rounds. One type of cord burns at a rate of about one ft per 20 seconds.

Improve Loading Machinery

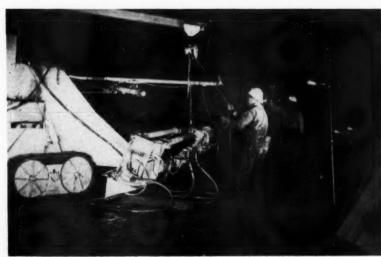
Contributing to more efficient operation, refinements have been made in the underground track-type of loader; for example, some of the overhead types have now come out with electric-motor drives. Eimco Corp. announced dual control available for its loaders, for teaching new men to operate the loaders more efficiently and for use in wide headings so that one man can operate two loaders by just stepping from one machine to the other. Cleveland-Cliff's Mather "A" mine uses a Canton track cleaner. made by the American Mine Door Co., to keep its haulage levels clean and in good repair. The company reports the machine does a satisfactory job.

There is still considerable experimentation in the design of draw holes in scram drifts, grizzly levels, and draw points for mechanical loaders to arrive at the best design in draw holes. Most of the literature states that a low, wide brow is the best, provided ground conditions will permit it. The 150-hp Vulcan-Denver tandem slusher needs only a seven ft wide drift for efficient operation; it is expected this slusher will find fairly wide acceptance in scram drifts where large tonnages are required.

Pre-cut wooden chutes are popular in many mines where cars are loaded from chutes. Where large tonnages are handled, steel and concrete are often used in chute construction. Some mines are eliminating chutes entirely by slushing directly into the cars or by loading the cars with mechanical loaders.

One of the new developments in shaft mucking recently announced is the low-head, hydromucker put out by the Bucyrus-Erie Co. This unit is available in both % and ½-yd sizes. As it has a lower center of gravity, many operators like it better than previous types. A circular track which has proved satisfactory has been developed for the Riddell mucker for use in circular shafts. For mucking inclined shafts up to 50°, slushers and ramps still prove popular. The Africans use cactus-type, air operated grabs and air-cylinder-actuated clam shells with good results.

In trackless mining, innovations in loaders are worthy of note. Eimco Corp. announced the new 105 loader, which has a tractor designed especially for its overhead-type loader. The Thew Shovel Co.'s Lorain scoop shovel has given good service in some of the room-and-pillar mines as well as the truck or half-track mounted scoop shovel put out by the Quick-way



Mounting drill jib on American Zinc's Gismo

Shovel Co. Diesel tractor loaders are still used to a great extent, and one operator reports the cast-over type gives better service than the type where the tractor has to turn around because of the reduced track and crawler assembly maintenance.

The American Zinc, Lead and Smelting Co. announced the "Gismo" in use in its Grandview Mine. The machine is basically a front-end loader mounted on a haul box having crawler treads attached. The whole thing is coupled ahead of a conventional 40-hp diesel, track-type tractor. The box is loaded and pushed to a muck transfer point. After the round is mucked out, three drifters can be mounted on the "Gismo" and the round can be drilled out. This machine gives a much better ton-per-man-shift figure than the slusher-and-ramp system formerly used.

Underground Transportation

Track haulage is still important in underground mines where tonnage does not permit the installation of conveyor belts, the trend being to wider track gauge, heavier rails, and larger, heavier units. Too, the diesel locomotive is finding use in many mining areas. On long hauls and for heavy tonnage, the trolley locomotive is extensively used. Steel ties and pre-designed switches are finding their way slowly into metal mines with a saving of labor installation time.

Conveyor belts are being used more in mines to replace other types of transporting equipment. Cleveland Cliffs Iron Co. announced the use of twisted belts in both its Mather "A" and Mather "B," resulting in much lower maintenance costs, as the clean side of the belt is always on the idlers.

In trackless and beltless mines, the use of diesel-powered equipment is still moving ahead. Diesel-powered trucks and tractor-and-trailer units are in widespread use and give satisfactory service. Diesel-powered shuttle cars will probably be employed much more in the future, as it is unnecessary for them to turn around in the heading.

Mining Methods

Rock bolts are being utilized more than ever. Experiment has shown that they efficiently solve many ground support problems and as a rule they are cheaper than timber. The expanding-shield type is popular, because the hole length is not critical and some operators feel they are easier to install than the split-wedge type of bolt.

Use of concrete for support is increasing. Many mines, especially those employing caving methods, are using concreted scram and grizzly drifts. The ability to transport wet concrete underground in pipes has made its use

practical. International Nickel Co. pours a concrete floor in some of the cut-and-fill stopes at the Garson mine to keep the ore from mixing with the waste. In some mines, prefabricated steel sets, some of them made from used railroad steel, are finding use for support in main level and scram drifts.

Bunker Hill & Sullivan Mining & Concentrating Co. uses a rather unique system to line scram drifts in its block-caving zones. The operators employ standard wooden drift sets, but in place of lagging between the sets they fill the space with short blocks and place them so that the cut ends are parallel to the long section of the scram drift. The ends protrude a few inches in from the drift sets. These blocks wear well, protect the timber, and can be used over. Day Mines, Inc., uses wooden rock bolts in its mines in the Coeur d'Alene district with favorable results.

Sand fill finds increasing use because of its ability to fill all voids, reducing ground settlement to a minimum. Deslimed mill tailings are often used. If the tailings are not deslimed, the fill shows hydrostatic characteristics which make it difficult to hold it in the stope. With the minus 325-mesh fines removed, the water will percolate out in a short time and leave a hard, compact fill.

The combination of rock bolts and sand fill has made it possible to mine some ore by cut-and-fill methods where timber support was required before. It is possible with further experimentation that timber methods may be gradually replaced by employing this and other methods. The sand can be readily placed as it is easily transported through pipes in a water mixture.

Resurrection Mining Co. instituted, in place of regular square-set system, the sub-level caving system at its No. 2 shaft near Leadville, Colo. This method increased production per man shift and reduced mining costs. Sublevel caving is also being used to mine irregular ore zones in some mines producing ore mainly by block caving.

With the new and proven equipment available, the use of sand fill and improved supports, it is expected that many new innovations in mining methods will be instituted in the near future which will increase safety, reduce costs, reduce fire hazards, and increase production per man shift.

Maintenance Vital

Materials handling has come in for considerable study in the past few years. The trend is to eliminate the handling of supplies by hand whenever possible. Much timber is being packaged into bundles, and handled by lift trucks into the cages; some mines have lift trucks underground to remove the bundles from the cages and place them on trucks. Many mine sup-

plies such as nails, pipe fittings, explosives, etc., are now palletized and handled by lift trucks until they reach their destination.

Many of the larger mine organizations are centralizing auxiliary operations such as timber framing to reduce the number of units in a certain area. Pneumatic or electric-driven saws and impact wrenches are in widespread use.

In virtually all operating mines, with an increase in mechanical equipment maintenance becomes a large problem. For more efficient maintenance and repair many mines have their shops underground near the scene of operations. Most operators are instituting a definite maintenance program and insist on its strict observance.

Much research work is being done on the use of wear-resistant steels for longer life in fast-wearing machine parts. Hard surfacing is being used to a great extent, not only in building up such things as loader bucket lips, shovel teeth, wheels, etc., but also in building up large gears and sprockets. This practice greatly reduces maintenance costs.

Use of the lubricants is being studied so that they perform satisfactory service under unfavorable underground conditions. One mine operator reports that the addition of Bardahl, an oil additive, in drill machine oil cuts down oil consumption and appears to reduce machine maintenance.

Future Looks Bright

Most of the operating companies are still giving a great deal of attention to labor relations. Efforts are being made to keep the men happy, hold them on their jobs, and to encourage them to accept the new equipment and ideas so that they will take full advantage of their possibilities. There is no established way this is being done, but many companies are still engaged in company-housing projects, where the miners can either buy their houses or rent them at a lower figure than they could in an ordinary settlement.

Many companies are running schools for their shift bosses and foremen to better acquaint them with current operations, new methods, new equipment, company policy, and the enforcement of the safety program. These companies have found this program pays off in a short time.

In conclusion, it is apparent that the mining industry has made great strides in the past few years to produce ore cheaper and faster per man shift. This alone, without the discovery of any new deposits, increases the ore reserves of the United States a great deal and, when the market for some of the metals reaches a normal, steady rate, the future of mining in the United States looks bright.



Roof bolting close to the face has resulted in greater protection from roof falls

Mining Safety in 1953

The Safest Operating Year in the History of the Mining Industry Deserves Comment

By EMERY C. OLSEN

Supervisor, Mine Inspection, Coal Mines & Quarries Columbia-Geneva Steel Division United States Steel Corp.

INJURY experience in underground and surface mines in 1953, as gauged by injury rates estimated from incomplete reports, indicate marked improvement over any other annual rate.

Bituminous Coal and Lignite

Particularly outstanding was the record year established by the soft coal industry. Operating at a high level of activity this industry's fatality rate is tentatively estimated at 0.81 per million manhours as compared with 0.82 in 1952.

It is estimated that underground coal mining claimed 406 lives, surface accidents 30 more, coal stripping operations 21. The estimated toll of all coal mines is 457 lives, 16.3 percent below the 1952 toll of 546.

Preliminary data sets the nonfatal

injury total for coal mining at 27,000 a 26.6 percent improvement over 1952.

If the 1952-53 accident experience can be used as an accident barometer, bituminous-coal mining, with the preponderance of mining employes, should accomplish outstanding safety achievements in 1954. From a high of 2534 fatalities in 1907 and from 2065 in 1926, this industry has gradually decreased its fatality toll to a low of 393. While certainly commendable, this figure is by no means comforting to safety-minded mining men who realize all too clearly that this is still too high a price to pay for coal.

Anthracite

Pennsylvania anthracite mines are estimated from early reports to have had 64 fatalities, a marked decrease

from the 1952 total of 99 and below a former low year, 1949 with a total of 91. The fatality frequency rate, estimated at 0.89, is lower than in 1951 and 1952 when the rate was 0.94.

The type of mining predominant in the anthracite fields, second and third mining, is not conducive to a favorable accident trend. However, operators are not overlooking any safety measure that will improve their accident experience. During 1952 a total of 25,549 hard coal miners completed the U. S. Bureau of Mine's Coal Mine Accident Prevention course. This educational program continued through 1953 with some companies achieving 100 percent training.

Major Disasters

It is significant and important that only two major disasters (in which five or more lives were lost) occurred during the year; a coal-dust explosion that caused the death of five men from carbon monoxide poisoning and a gilsonite-dust explosion that took eight lives.

It becomes more apparent each year that improved ventilation, increased application of rock-dust, proper installation of permissible electrical equipment and more thorough inspections of mines will eventually eliminate this menace of the industry, an explosion.

Metal Mining Safer Too

The downward trend of fatality rates for the noncoal mining industry has been remarkably consistent and presents factual proof of the success of accident prevention work within the industry. From 1942 to 1953, fatality rates dropped from 0.90 to 0.51, a reduction of roughly 35 percent. For the same period nonfatal accident frequency rates dropped from 63.31 to 42.70.

Improvement in metal mine safety lies almost entirely within the industry itself, and the industry is doing a good job. A total of 7267 metal miners have completed the Metal Mine Accident Prevention Course offered by the U. S. Bureau of Mines.

Quarries

Accident reports reflect some improvement in injury frequency rates for the quarrying industry. Nonfatal injury experience was slightly improved and the frequency rate reduced to 24.85 in 1953 from 25.32 in 1952. Quarry mining has experienced a favorable trend in fatality rates since 1949. The 1953 fatality rate is expected to be 0.26.

Improvement Factors

Credit for a new all-time low fatality rate is shared by mine operators and mine workers, the U. S. Bureau of Mines, State inspection agencies, coal operators' associations, mine workers' unions, manufacturers of mining equipment and many other agencies all contributing to improved health and safety conditions in and about the mines.

Progressive operators realize that safe equipment, safe mining methods, and a good safety program are essential to production and that the



Clean, well-supported and heavily rock-dusted shuttle car haulage roads are essential to modern mining

responsibility for safe working conditions and for maintaining an effective, comprehensive safety program lies mainly with management; however, it is the duty of every worker to accept and support such a program. Only through cooperative effort can a safety program prosper. It has been estimated that the mining industry spends more than \$100,000,000 annually for the miners' health and safety and for plant protection.

Replying to a request for comments on the subject of safety at mining operations, James Westfield, Chief, Health and Safety Division, United States Bureau of Mines, stated, "Based on available data for the year to date, the injury experience in the mining industry for the year 1953 will prove to be one of the best yet recorded. . . There is marked improvement in the frequency and number of fatalities at coal mines, for at present, almost 100 fewer men have died from mine accidents, and the death rate is the lowest on record. We are pleased with the continued cooperation we are receiving from State mining officials, offices of labor

INJURY	FREQUENCY	RATES*-	-Mines and	d Quarries-	-1949 to	1953‡

Year			Mining Nonfatal			Mining Nonfatal	Qua	rries Nonfatal
rear	Fatai		Aomatai Fai		ratai	ratai Noniatai		Nomiatai
1953		0.82	48.67		0.51	42.70	0.26	24.85
1952		0.84	57.14		0.55	43.01	0.27	25.32
1951		1.06	50.70		0.59	42.84	0.29	25.21
1950		0.90	51.94		0.57	44.74	0.28	25.12
			55.11		0.48	48.07	0.36	26.48

* Per million manhours of exposure. † 1952-53—Preliminary Data.

INJURY FREQUENCY RATES—COAL MINING—1949-53*

	No. o	No. of Injuries		ncy Rates†
	Fatal	Nonfatal	Fatal	Nonfatal
Bituminous Coal:				
1953	393	22,300	0.81	46.15
1952	447	30,500	0.82	56.37
1951	CLOSE .	30.525	1.08	48.04
1950	wwo.	28,380	0.92	47.83
1949	40.4	27,548	0.93	51.67
Anthracite:				
1953	64	4.700	0.89	65.71
1952		6,300	0.94	60.92
1951	400	7.115	0.94	66.55
1950	00	8,855	0.80	71.72
1949	0.4	7,857	0.83	71.88
All Coal:				
1953	457	27,000	0.82	48.67
1952	W 4.64	36,800	0.84	57.14
1951		37,640	1.06	50.70
1950	0.40	37.235	0.90	51.94
1949	FOF	35,405	0.91	55.11

* 1952-53—Preliminary Data.
† Per million manhours of exposure.

organizations, and supervisors and others on the staffs of mine-operating companies. Without their combined cooperation, improvements in safety in the mining industry cannot be obtained. It is our earnest hope that continuing effort, on the part of each individual engaged or connected with the industry, to practice safety in all phases of mine work, will result in improving the injury experience in future years."

More No Lost Time Injury Mines

A good measure of progress in mine safety is the perfect safety records of no lost-time injuries during 1952 made by 186 mines and quarries entered in the National Safety Competition. It is anticipated that the 1953 total of no lost-time injury mines will exceed the record year, 1952.

During 1953 the Joseph A. Holmes Safety Association awarded Certificates of Honor to 527 individuals, mines, plants and companies for outstanding safety performance.

July, 1953, marked the end of the first year of operation of the Federal Coal Mine Safety Act and the seventh year that the Federal Mine Safety Code (recently revised) has been in effect. From July, 1952, to July, 1953, 3056 regular coal mine inspections and 3281 check inspections were made by Federal Inspectors under Title II of the Act (applicable to mines employing 15 or more persons). In addition, 4091 inspections were made of small mines and strip mines.

Training courses in accident prevention were attended by an estimated 18,750 mine officials and mine employes during 1953. An additional 10,000 attended the short courses in roof control and haulage. Some 33,000 First-aid Certificates were issued and Mine Rescue Certificates were earned by 2000 miners. The interest in safety stimulated by the safety courses was reflected in many mines by improved safety performance.



Kind of Company	Nu	ım	ber	of Award
Coal Mining				94
Metal Mining				. 78
Petroleum				58
Quarries				18
Nonmetallic Mining				. 8
Individuals*				. 271

* Note—Nine medals and certificates were awarded to individuals for saving lives at risk of their own lives.

fort is needed to effect further reduction of accidents in this category.

It has been reliably established that 74 per cent of all fatalities from falls of coal and rock occur within 25 ft of the face and that three out of four fatalities in this zone occur in the small area between the last permanent roof support and the face, an average distance of 13 ft. With knowledge of these facts, a more intense application of known roof-support measures is indicated.

Haulage, Second Killer

Haulage accidents were estimated to be responsible for the deaths of 80 mine workers last year, second on the list of principal causes of mine fatalities. It is estimated that 30 percent of the haulage accidents were caused by inadequate clearance and approximately 28 percent were from operation of haulage equipment. Both causes are focal points for correction.

Safety people believe that the inadequate clearance type of accident will, in time, be eliminated by the use of roof bolts, systematic timbering methods designed to accommodate present-day equipment, controlled haulage, and increased use of belt convevors.

Room for Improvement

Although progress has been made over many years, the mining industry remains as one of the more hazardous major occupations. Yet within the mining industry many individual mines have worked hundreds of thousands of man-hours without lost-time injuries and produced millions of tons of coal, ore and stone without fatalities. Such individual records clearly indicate that all mines can be made far safer places for men to work than at present.



Credit for improved safety record in metal mines goes to industry itself

The National First-aid and Mine Rescue Contest was held at Fort Wayne, Ind., September 29-October 1, with 58 teams competing in the "World Series of Safety Meets." It is anticipated that resumption of this national contest will reawaken interest in first-aid training.

Roof Control Needs Emphasis

The estimated 1953 total of 275 fatalities from falls of roof, ribs and face in coal mines, while less than the 1952 total, is roughly 60 percent of the total of all fatalities. Proportionally roof, rib and face fall accidents seem to be increasing. This would indicate that emphasis should be placed on this phase of mine safety. Factors such as roof bolting, standardized timbering methods and closer supervision at the working face have contributed a great deal to the year-by-year reduction in fatalities from falls of coal and rock. However, it is generally conceded that additional ef-



A continuous mining machine operating under bolted roof



International Minerals new phosphate chemical plant at Bonnie, Fla., also produces uranium as an important by product

Phosphate and Potash

Digesting Last Year's Expansion Phosphate Industry
Again Sets Production Record While Potash Industry
Also Sets Output Total

By THOMAS M. WARE

Vice-President, Engineering International Minerals and Chemical Corp.

PHOSPHATES—The Phosphate Industry is winding up on the final lap of the gigantic construction program reported in last year's industry survey. With new chemical plant additions blossoming all over the Florida, Tennessee and western states phosphate rock producing areas, it is clearer than ever that the industry is attuned to the needs of both farmers and industry for higher analysis phosphate chemical components.

Bringing the \$90,000,000 of new plant facilities into production and getting the new higher analysis goods to market is the job that remains. So the phosphate producing industry might well be described as settling down to digesting its own expansion program, both during the past year and for the year ahead.

Florida Report

The Florida area accounted for over \$60,000,000 of the industry expansion program reported last year. Just about all of this expansion consisted of new chemical plant construction, although two companies had announced plans for building two new phosphate rock mining and beneficia-

tion plants. A brief run-down of the present status of the program follows:

International Minerals and Chemical Corp. completed construction of its new Bonnie Phosphate Chemical plant at midyear. Just when the plant was getting under way the plant union went out on a 53-day strike. While the strike delayed International's schedule for production, it is symptomatic of the industry's star-up difficulties as chemical production is introduced into a field where labor background has been relatively nontechnical. Making trained chemical operators out of citrus farmers, cattle ranchers, and phosphate miners takes time.

The Bonnie plant is making 20 FOS, a trade name brand phosphate animal feed supplement, and multiple superphosphate to be used in "high analysis" fertilizers. Uranium is also now being produced at this plant, first public release of this information just having been made.

Virginia-Carolina Chemical Corp. is just completing its large new triple superphosphate plant. This new plant adds impressively to V-C's operating center at Nichols where they have large phosphate rock storage, drying, grinding, shipping operations, a calcining plant and an elemental phosphorus furnace.

Best guess is that V-C will be ready to start production of triple superphosphate within about two months from now. They also expect to produce by-product uranium, according to an AEC announcement stating that a production contract had been awarded to V-C for production of this vital element.

Davison Chemical Corp. is just now starting up its new triple superphosphate plant at Ridgewood. Their sulfuric acid plant began operating in December, and the main plant is expected to be operating within 30 days.

F. S. Royster Guano Co., a newcomer to the Florida producing area, has moved up fast on the construction scene and will probably begin operation of its new triple superphosphate plant early this spring.

The new triple superphosphate plant addition at the U. S. Phosphoric Products Division of the Tennessee Corp., Tampa, Fla., has been completed. Armour's expansion of its triple superphosphate plant at Armour, Fla., has been completed. Swift and Co. completed a 50 percent capacity enlargement of its triple super-production facilities at Agricola during the year also.

Reviewing next the mining and beneficiation plans of the Florida phosphate industry, the number of developments in this part of the industry are not many, because most of the phosphate producers have been giving most of their attention to the construction and start-up of their chemical plant unit additions. Summarizing, this part of the industry reports as follows:

Armour Fertilizer Works delayed start of construction for its new mine, washer, flotation plant, storage, drying, grinding and shipping facilities until late in the fall. Last year it was reported that a certificate of necessity had been granted to Armour in the amount of \$5,608,000 for this new mine and plant, that it is expected this will add 750,000 tons per year additional phosphate rock producing capacity to the area.

International Minerals and Chemical Corp., by making processing recovery improvements and by eliminating certain process bottlenecks has found that it can postpone the construction of the new plant and mine announced last year. At the Noralyn plant the spiral section capacity was doubled, and cone classifiers were also installed.

Within another month the new 1250B Bucyrus dragline should be in operation at International's Noralyn mine. Dubbed the "Super Scooper," it will have a 235-ft boom to attain a 218-ft reach, will carry a 26-yd bucket.

International's metallurgical department has developed a new core barrel for use in prospect drilling. It will enable taking of cores in soft unconsolidated sedimentary deposits of the type found in the phosphate country. A 50 percent increase in drilling rate has been realized.

V-C has put into operation the newest equipment in wet phosphate rock storage and reclaiming equipment, employing a double-wing conveyor stacker.

American Agricultural Corp. is reported raising its South Pierce plant recovery efficiencies employing belt separators.

American Cyanamid has just completed erection of a new 500W dragline having a 13-yd bucket capacity,

TABLE I

U. S. Production	'53 Estimated (Long Tons)	'52 Actual* (Long Tons)
Western Fields Tennessee Florida	1.7 million	1,381,338 1,444,737 9,205,138
Total	12.7 million	12,031,213

* U. S. Minerals Survey, Bureau of Mines, Dept. of Interior.

TABLE II

	Percent of Total			
Florida	Tenn.	Western States	U. S. Total	
Superphosphates	17	27	57	
Phosphorus, Ferro Phosphorus 7	64	44	18	
Direct Soil Application 10	16	9	11	
Fertilizer Filler (1)	1		(1)	
Stock & Poultry Feed	2	(1)	• 9	
Other Used(1)	(1)		(1)	
Total	100	100	100	

175-ft boom. This new dragline completes their dragline modernization program, retiring all of their older 104 equipment (they have three new 650 R's).

Western States and Tennessee

In the western phosphate producing states and Tennessee there are few new developments to report. Of major importance is Monsanto's construction start on its second large electric furnace for the production of elemental phosphorus from western phosphate shales. Although little information has been released on Monsanto's new furnace, it probably is of the 40,000 kw size capable of pro-

ducing 25,000 tons per year of phosphorus as reported for their first unit.

In Tennessee the major event of the year was Shea Chemical Company's new 30,000-kw phosphorus furnace coming up to full production. This was a furnace to make 20,000 tons per year of elemental phosphorus to be used principally in the manufacture of dicalcium phosphate and phosphoric acid for commerce.

Another small producer of direct application (for farm use) phosphate rock entered the production scene this past year—The Boyle Phosphate Co. This new plant is in the Duck River area and consists of drying and grinding facilities only. Production capacity will probably be around 75,000 tons of product per year when the plant begins operation this spring.

Phosphate Rock Production

Production of phosphate rock was up again to set another record during 1953, according to best estimates of the industry. The official Mineral In-dustry Survey by the U. S. Bureau of Mines, Department of Interior, will confirm this, although their final report is usually delayed until September. Just this past September, the U. S. Bureau of Mines issued their 1952 report (Table I) confirming sizable gains, and showing 32.8 million long tons total mined products basis of phosphate rock mined with increases shown in western states (up 21 percent), Florida (up 12 percent), and Tennessee (up 1 percent). Even so, in 1952 the "apparent production" of phosphate rock was up 5 percent, which indicated some imports of finished product.

Phosphate Markets

A breakdown of the Bureau of Mines '52 report shows interestingly the difference in the end use of the phosphate rock by producing areas as



F. S. Royster Guano Co. will probably begin operation of its new plant early this spring

sold or used by producers. (Table II)

The weight of the Florida tonnages consumed on the domestic market, of course, is felt in the final weighted average of U.S. consumption as shown above, where superphosphates provide by far the largest end use-5.9 million long tons out of a total 6.5 million long tons which went for this purpose. The difference of the markets for western states and Tennessee when compared with the Florida markets shows up strongly by the proportional tonnages given in these areas to what might be termed the chemical end of the market: Tennessee and the western states gave 1,400,000 tons to this market out of a total of 2.000,000 tons total which went for this use.

In the next year or so the superphosphate proportion of the domestic use of Florida phosphate rock production should continue to hold its place of importance and probably to rise. Farm users continue to ask for higher availability of P2O5 in labor saving, more concentrated form, and the industry has been building for this. When the number of new triple superphosphate units in Florida come on the line this year, there will be sizable increases in triple superphosphate production from Florida, an effective way to keep the delivered cost per unit of P2O5 lower and more competitive with phosphates which are sold for this use in other areas.

Some interesting developments are currently under way in the chemical marketing end use for phosphate rock production. Several producers have bet strongly on the growing dicalcium phosphate market needs. International Minerals and Chemical Corp., Texas City Chemical, Shea Chemical Corp., Monsanto Chemical, American Agricultural Corp. and Victor Chemical Co. are all major producers in this

Texas City have come in just this past year with "wet process" plants for the production of dical, whereas the others have been producing dical growing market. IMCC (Bonnie) and by the elemental phosphorus process "route." This should result in newer phosphate rock market gains in the years ahead as phosphate rock is chemically processed to become the preferred source of phosphorus in animal feed supplements.

POTASH-It certainly has been perfectly clear to the potash industry over the past year that there is such a thing as a law of supply and demand. As was pointed out sometime ago in this column, at a time when new producers were making bold plans to enter the potash producing scene at Carlsbad, N. M., too high potash producing capacity would bring difficulties to the potash mining industry. And, now that the potash industry has expanded so much during these past few years, some factors in the supply-demand equation are bound to be changed.

Traditional foreign sources of potash are determined to maintain their position in our country's market in the face of a realization that there is enough domestically produced potash on hand to satisfy total U.S. needs. Foreign sources, notably Russian, have been waging a tough price battle at eastern seaboard delivery points which are seriously challenging the potash prices offered by domestic producers of the West. The high railroad freight costs to deliver potash from the West to eastern seaboard areas is being felt more than even under these circumstances.

Several of the Carlsbad producers now have warehouse stocks of potash on hand in proportions that the industry hasn't known in the last 13 to 15 years. One company is trying

a method of storing potash outside until it can build its new covered storage requirements. There also is reported a firmer attitude on employment in the Carlsbad potash producing basin, with some labor cutbacks being reported. Some "outsiders" and potentially new producers have decided to defer their earlier announced programs for entering the Permian basin with additional producing capacity.

In Washington, a House agricultural subcommittee has recommended that all imports from Iron Curtain countries be stopped because domestic production, plus small imports from free countries, now satisfy foreseeable needs. This subcommittee sees the Iron Curtain country potash as a serious threat to the potash industry and states that continued imports from these sources cannot possibly benefit the economy of the U. S.

New Production Records Set

Aside from the economics of potash producing capacity and the effect of foreign imports upon the industry's future stability, the fact that the potash industry established another record for production during the past year seems certain. The American Potash Institute of Washington, D. C., recently reported that for the first nine months of 1953 total deliveries by domestic producers and importers added up to 2,445,411 tons of potash salts, equivalent to 1,425,351 tons K2O. or an increase of ten percent in salts and 11 percent in K2O equivalent over the corresponding period last year.

The official U.S. report on production is made by the U.S. Bureau of Mines, Department of the Interior, in its annual minerals survey bulletin usually out about June, so some time will pass before the year's performance estimates on the basis of the Potash Institute report are tallied and confirmed. In the Bureau of Mines report of last June, however, 1952 was shown to be a record year, up 16 percent over the year earlier. While sales and apparent consumption were up 12 and four percent respectively, the stocks on hand doubled at the end of the same period.

Production News

There has been a notable switch from emphasis on large new productive capacity during the past year to one of increased operating efficiency throughout the basin. Highlights of individual company reports in the Carlsbad area are as follows:

International Minerals and Chemical Corp. is in the start-up phase of operating its new hydrochloric acid and magnesium oxide plant additions at its main plant site. This plant addition will improve operating efficiencies by producing new products peculiar to their ores there. . . . An en-



Western production exceeded two million-ton mark



U. S. Potash plans to haul ore underground from No. 3 shaft to No. 1 and the mill six miles away with a 40-ton locomotive

larged hoisting capacity was realized following changes in the skip capacity and hoist motor drive system. Automatic remote-controlled hoisting is a feature of the new hoist, together with an ultra-modern operator hoist control room located at the collar of the production shaft. . . . A new 100,000 ton storage building was added to the plant to round out product storage requirements commensurate with plant capacity growth in recent years.

International completed erection of a large scale pilot plant for testing and developing design data for its new dry beneficiation process. This new process is to be the basis for a new plant to be built in Lea County over the company's newly discovered ore reserves. A pilot hole has been sunk at the proposed new shaft location, also preparatory to development of this new orebody.

U. S. Potash is nearing completion in sinking its No. 3 shaft six miles north of its present No. 1 operating shaft. A fairly long underground haulage line between the two shafts is planned, and tunneling has begun from their No. 1 shaft toward the No. 3 shaft area. . . U. S. Potash plans to operate the haulage system using a diesel electric 40-ton locomotive. General Electric made the locomotive and has just delivered this unit. . . About midyear the company plans to erect a new covered storage building of 50,000 tons storage capacity.

Potash Co. of America extended its search for additional potash ores to Canada announcing in November this past year that the company had taken out potash prospecting permits covering 100,000 acres near Saskatoon in the province of Saskatchewan, P.C.A. has prospecting permits in this area similar to those held on properties in New Mexico, they may be converted to a lease for a portion not exceeding 10,000 acres if commercial potash ore is discovered within a three-year permit period. It is intended that \$220,-000 may be spent during the period of exploration. It is understood that potash occurrence in this region may exist at a 3000-ft depth.

Around the first part of last year P.C.A. announced a mine and plant

modernization program involving a total outlay of \$3,000,000. The program for modernization is understood to emphasize improved underground mining equipment. Two new Joy 4JCM continuous miners have been placed in operation, and it is understood that an additional two more of the same type are on order. P.C.A. has had two continuous miners of their own make in operation for quite some time, to which they shortly plan to add two more of the same style also. ... Belt conveyor gathering systems employing fairly long hauls are another feature of underground mining methods pioneering that P.C.A. has been doing to lower production costs.

Southwest Potash Co., relatively new to the potash producing area (having started production as recently as October, 1952) already has plant improvement and new building addition plans under way. Details of these plans have not been published. It is understood, however, that the company is building a 100,000-ton storage building. Some changes in the process handling of tails to improve recoveries is contemplated and their sink-float granular plant is due to be remodeled to improved performance.

Duval Sulphur and Potash Co. is

also building a new storage warehouse, estimated to be of the 50,000-ton size. . . This company has had some wildcat strike difficulty. In August an election was held at the request of the two main unions represented at the plant to determine sole bargaining representation, but the results were inconclusive, and no representation was declared. The International Union of Mine, Mill & Smelter Workers, and District 50, United Mine Workers of America have asked for another election.

There were few other major announcements made in the industry. Both Freeport Sulphur and National Farmers' Union Service Corp. who have been actively considering the construction of additional mine and plant facilities at Carlsbad, have made no further public statements regarding their plans for plunging into an already amply satisfied market with additional plant capacity. Freeport has moved its potash offices from Carlsbad to Hobbs, N. M. National Farmers Union has moved its office to Artesia, N. M. . . . American Potash and Chemical Corp. also is reported to have decided to discontinue plans for development of an orebody in the



Hoistman at International Minerals & Chemical Corp. handles hoisting operations by remote control



Climax reported a million-lb, 68 percent WO3 recovery in first year of tailings retreatment

Milling in 1953

Bright Future Tempered by Markets and Prices

By NATHANIEL ARBITER

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THE year end outlook in mineral dressing is tempered by the indications that an adjustment in the economy is in progress. This had been foreshadowed by the slump in lead and zinc prices to levels that forced shutdowns in some mines and mills in 1953. By mid-year the copper shortage began to ease, and by the end of the year there was a general expectation that the price of the red metal would fall. December also saw a drop in steel production and a decline in scrap iron prices. This is not the place to dwell further on metal prices except to point out that the emphasis in milling of base metals in the immediate future may well be on maximum efficiency rather than on crowding for maximum production.

New Plants

In the past two years the keynote for this review has been the impressive roster of announced plans for large new mills, particularly in copper and iron. During 1953, in contrast, there have been fewer announcements of plans of this type but instead the starting of operations on some and definite dates for start-ups on others. Thus the Greater Butte project and the new Chugui were running during this year while Anaconda's Yearington leach plant started up in the fall. Silver Bell, Copper Cities, Ventures Ltd.'s Opemiska mine and Rhokana's Bancroft mine are scheduled to start this year. New projects, not previously mentioned in this review are A. S. & R.'s Toquepala open pit at 22,000 tpd, Rhokana's new leach plant to treat 6000 tpd and Mufilira's Chibuluma mine and mill. The latter two are scheduled to start in 1956.

Also in the news were the following: Oliver may build a \$60,000,000 beneficiation plant at Two Harbors, Mich.; Freeport discovered nickel at Moa Bay, Cuba, and plans to use a leach-precipitation process; Foote Mineral expanded spodumene production at Kings Mountain, N. C.; Barvue Mines operated at 5000 tpd, New Jersey Zinc plans a 1000 tpd zinc mill at Jefferson City, Tenn., and will complete this year a 2400 tpd zinc mill at Friedensville, Pa.; Du Pont

will spend \$3,000,000 to build the Highland plant for ilmenite in Florida; Climax expanded milling capacity by 10,000 tpd and drew its first ore from the Storke level; Hanna will exploit the nickel deposits near Riddle, Ore., to produce ferronickel; the new Broken Hill started up in late '52 at 1600 tpd and the Williamson diamond mill in Tanganyika is scheduled to start this year at an eventual 5000 tpd.

Major planning for iron ore concentrators has been reviewed in past years. At the present time three pilot plants are operating on the range with a combined capacity of 1,000,000 tons per year, and plants are building or on the boards to produce 20,000,000 tons per year of concentrates by 1960.

Crushing, Grinding, Classification

New developments in these operations are in the direction of new machines, particularly for grinding, and in more efficient use of available machines. The vibrating ball mill has grown out of the laboratory and is reported to be under test by one of the iron ore companies. A study of its principles is under way at M. I. T.

Interest in rock instead of steel for grinding medium continues. Nundydroog reported that all tube mills now use granite pebbles fed at about 3½-in. size while Tennessee Copper is experimenting with lump marble for grinding marble chips and is considering tests on ore.

Tennessee Copper also confounded the experts by decreasing the ball-load in its large slow speed mill with proportionate drop in power but no de-

crease in capacity. There is a continued interest in large high speed rod mills for the fine crushing coarse grinding field. The first one in Australia is now operating at New Broken These combine direct impact breaking of coarse particles with nipping of finer particles and consequent large reduction ratio. While many of the more recent mills have adopted the rod-mill ball mill combination to go from about one in. to concentration size, there are still examples of opposition to this trend; for example, Barvue use of Tricone mills from 1/2 in, to flotation size and White Pine's mammoth mills for single stage grinding. Justification for White Pine's choice was in part the very large indicated savings in equipment cost by the use of the largest possible ballmill size. The final answer to singlestage versus two-stage grinding is not yet in. The most thoroughly documented comparison has been for a low tonnage operation. In the 15,000 to 50,000 tpd range such factors as first cost, operating labor, spare part inventory, floor space, and over-all circuit simplicity may in some cases still favor the single-stage circuit.

In another trend, the Mining Magazine (London) predicts the eventual abandonment of free settling classifiers in grinding circuits, with no commitment as to the replacing of equipment. A possible straw in the wind is the increasing use of cyclones, particularly to close regrind circuits. Such applications are reported on trial in several installations and have replaced conventional classifiers at Rand Leases, South Africa.

Comparisons of open top cyclone performance against conventional classifiers indicated several fold greater capacities per unit area for the former. Use of the closed top cyclones for desliming and thickening is widespread. On a recent field trip to upper New York State, three of the four mills visited had them at work. Most novel application was in sizing tailings to help in building tailings dams.

Concentration

Almost 5000 Humphreys spirals are now in use. Lining with sheet neoprene at Trail Ridge was reported to increase life significantly over cast iron. Average performance of spirals on a variety of applications are 1½ tons per spiral per hour with feed sizes between eight and 200 mesh. Pulp volumes run 20-25 gpm with an equal flow of dilution water.

Interesting results were reported by Cleveland Cliffs and Pickands-Mather on cyclones as heavy medium vessels for ¼ in. by 65 mesh iron ores. Performances were encouraging but several unsolved problems were indicated. An important paper on the applica-

FLOTATION REAGENT CONSUMPTIONS

	World	United States
Collectors Frothers Lime Soda ash Zine sulphate Sodium cyanide	24.8	9.8 million pounds 14.4 508 74 29 91/4

* Chemical Engineering, January, 1954.

tions and theory of the heavy media cyclone was published in the Proceedings of the IMM Symposium.

Standard heavy medium separation continues to expand. New installations for 1953 were on coal, iron ore, lead, lead-zinc, pyrite, chrome, manganese, diamonds, potash, tungsten, fluorspar, gypsum, lead-copper, and gravel.

Climax reported that over 1,000,000 lb of 68 percent WO₃ had been produced in the first year of operation of its tailings retreatment plant. Tin and pyrite were also obtained from its classification, tabling, spirals, flotation, and magnetic separation circuit.

Flotation recovery of sulphur from low grade ores is very much in the news. Yerington's leach acid is obtained from such a source and several other new operations were reported. A promising innovation is the autoclaving of raw ore to melt and then agglomerate molten globules, with savings on grinding and easier separation by screening and flotation. Pressure filtration then gives products of over 99 percent purity.

Details of the Kings Mountain amine flotation of gangue from spodumene were published as well as Minerva's flotation of acid grade fluorspar and Kona's feldspar flotation. Duval Potash described the development of a tailor-made depressant for clay in potash flotation by selecting an organic reagent to fit the clay crystal lattice. Cleveland Cliffs will now have two flotation plants on Michigan hematite and flotation is being considered for martite in New York State. Fine garnet is recovered by flotation and uranium is partly concentrated by flotation at Radium Hill, Australia. The accompanying table gives current flotation reagent consumption esti-This is apparently a temptmates. ing field since a number of chemical manufacturers having been eyeing it.

A new type of frother has been put on the market and a new flocculating agent is claimed to be useful in thickening and filtration.

Materials Handling

Cleveland, Ohio, is considering a \$6,000,000 conveyor belt system to move ore and limestone from Lake Erie to the steel mills. Pittsburgh Consolidation's coal pipe line at Cadiz, Ohio, proved economically sound. A review of equipment and problems in conveying hot, bulky material was published and a twisted belt conveyor was described to handle wet, sticky



Open top cyclones were compared with conventional classifiers

ore by reducing spills and maintenance. Also new was a two-way belt conveyor for simultaneous handling of coal from the faces and men and supplies into the mine. This is accomplished by appropriate belt twists.

Automatic Controls

An excellent survey of automatic controls in milling was published by Lawver. He reported as successful those for pH, liquid level, and dry or moist tonnage. Still troublesome is control of density for pulps with over 50 percent solids. Completely automatic control of grinding, although of greatest interest, is still not satisfactory because of inability to measure particle size on classifier overflow continuously and to determine dry solids content of wet pulp. Maintenance of control equipment - which is always raised as an objection to it-is reported to average one man hour per week per \$100 of control equipment.

Hydrometallurgy Used Widely

Leaching continues to find new uses. At least two South African gold mills started to recover uranium. Rum Jungle in Australia will start its uranium treatment plant this year. Howe Sound, reported in trouble with its cobalt production at Garfield earlier in the year because of abrasion and corrosion, is now obtaining a respectable output. National Lead will start up its Fredericktown cobalt plant this year. Sherrit Gordon's Ottawa pilot plant had a successful run, and details of its process were published. Freeport will try out the pressure leachpressure precipitation scheme for nickel at Moa Bay, Cuba, and a similar process is in use for recovering copper from scrap.

Leaching also dominates plans for domestic manganese recovery where milling is usually unsatisfactory. The Aroostook, Me., deposit will have a nitric acid pilot plant. Other leaching schemes for this metal involve sulfur dioxide, ammonia, carbon dioxide, or caustic. Manganese, Inc. described its roast—sulfuric acid leach—electrolysis process for production of high purity, battery grade MnO₂.

Bagdad will roast its copper concentrate by fluidizing and recover copper by leaching and electrowinning. Excess acid will leach oxide ore and pyrite cinder from the roasters may be reduced to sponge iron.

By-Product Recovery

One of the most striking features in the last decade of milling has been the increasing development of processes for the recovery of by-product minerals from ores. This extends from the recovery of relatively large amounts of pyrite and pyrrhotite from copper, lead and zinc ores down to trace amounts of more valuable minerals.

The recent shortage of sulphur focussed renewed attention on pyrite as a source of sulphur dioxide. Numerous instances both here and abroad indicate that increasing amounts of iron sulphides, formerly lost in tailings, are being recovered. They are being used not only as a source of sulphur but in many cases as iron blast furnace feed. Noranda's plans to make a 65 percent sinter is a case in point. A more unusual application, still experimental, is the attempt to

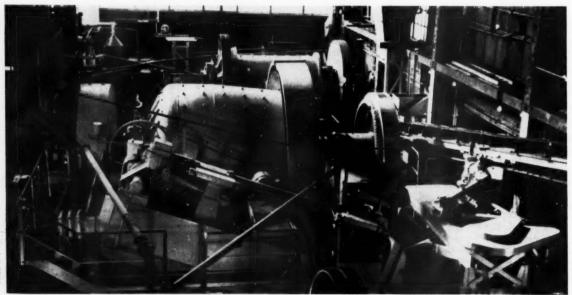
make electrolytic iron by ferric chloride leaching of pyrrhotite. Free world production of sulfur equivalent from pyrite was estimated as 4½ million tons in 1952 and this is expected to increase to 5½ million tons by the end of 1955.

Climax recovery of wolframite and cassiterite from molybdenite tailings is well known, as is the recovery of MoS₂ from copper concentrates in the Southwest in amounts running down to 0.2 percent. Of more recent date are the recoveries of traces of tin and columbite from the spodumene operation at Kings Mountain, of zircon from the beach sands in Florida, and in the extreme limit the recovery of uranium from South African gold tailings.

With the growing emphasis on the newer and rarer metals often present in trace quantities in other ores, the problems of metal recovery are diverging from the standard crush-grind-float-smelt, to the use of a whole battery of concentrating techniques, often supplemented by roasting and leaching.

Literature

Of a total of 175 abstracts on milling and related subjects appearing in Chemical Abstracts for 1953, 129 dealt primarily with unit operations and 46 with specific ores. Of the mill operation papers, 59 were on flotation, 13 on crushing and grinding, 10 each on centrifugal and sink-float separation, 8 on magnetic separation and the rest scattered. Of these 129 unit operation papers 41 or ½ were on theory and the rest on application. This is a well-balanced proportion with the general impression gained that theory on many fronts is advancing rapidly.



Tennessee Copper decreased ball load in large, slow-speed mill without decreasing capacity



Complete belt haulage from face to tipple is increasing

Mechanical Coal Mining Progress

Times Are Right for Development of More Efficient, Higher Capacity Mining and Loading Equipment

By R. LAIRD AUCHMUTY and MILO W. SUMMERS

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COAL production during 1953 was approximately 452,000,000 tons, about 3½ percent below the 466,841,000 tons produced in 1952. The year however left much more to be desired profitwise. Generally speaking, net realization was less than prevailed before the last three wage advances. Since the first of those has also been a substantial increase in the cost of supplies. All this adds up to the necessity for many mines to reduce operating costs to the very minimum in order to survive, and adds incentive for even the most favorably situated operations to effect cost reductions. This incentive is also stimulated by the uncertain outlook for the immediate future. The industry will no doubt see a further reduction in overseas export tonnage, a possible reduction in lake shipments on account of availability of natural gas in the northwest and further reduction in the use of railroad fuel, plus a wage contract now in effect for an unknown duration.

All of these factors have resulted in an increase in the proportion of mechanically mined coal. In 1953 this will probably amount to 78 percent of underground output. They have also resulted in a revaluation by many operators of mechanical equipment already in use. In this connection serious studies of the component parts of mining operations and organizational setups have been more generally used. They have frequently resulted in increasing operating efficiency, over-all man day output and the more efficient use of supplies, etc. Conditions existing in 1953 caused more than ordinary emphasis on efforts to eliminate labor, increase man-day output, and concentrate the sources of production.

Replace Old Equipment

Revaluation of mechanical mining equipment in use has in some cases resulted in the replacement of older types of equipment with newer machines of greater capacity, or in



Rotary drilling for roof bolting is now favored, with much work being done to develop improved cutting heads



Much interest is being shown in foreign coal plow used on retreating longwall faces

changing the type of equipment used in favor of that having greater capacity and mobility and less maintenance because of more rugged design. These changes often make necessary additions to, or revision of, preparation facilities.

The year was characterized by a decrease in the use of hand or mechanically loaded chain and shaker conveyors and the substitution of low vein, high capacity loading machines, along with low vein shuttle cars, or in conjunction with belt conveyors. Several high capacity mobile loaders for intermediate seam heights were also introduced. There was a decided tendency to support loading operations with mobile rubber-tired cutters, coal drills, roof bolting drills, etc. Direct loading of mine cars by mechanical loaders and use of track mounted loading machines and other track mounted face equipment is decreasing rapidly, except in isolated cases.

Use of continuous mining machines is making steady if slow progress. For the year 1952 it is reported that 152 of these machines were in actual use and produced 8,215,000 tons, largely from ripping type machines. It is

not expected that final figures for 1953 will show any substantial increase in the percent of total output produced by continuous machines.

Boring type machines are undergoing changes in design to make them more flexible and adaptable to general use. One such machine that had a limited use for many years has recently created widespread interest. It is reported that a loading machine of the ripping type that has been under development for some years may soon be made available.

Probably the greatest technical interest this year was attached to the release of information concerning a remote control machine with attached conveyor transport and very high man-day output. It was known to be under development for some time and may soon be available for general use. One coal mine has adapted remote controls to a standard continuous machine with trailing conveyors. Continuous machines, one of which uses a walking mechanism for maneuvering, are now available for thin seam operation. Continued progress is being made in the designs of cutting heads for all continuous machines to reduce the amount of fine

coal. Advance is noted also in the development of cutting elements having better wearing qualities to cope with hard and abrasive seam impurities.

Work on Service Haulage

Efforts to make the continuous miners more nearly continuous in operation have led to the development of extensible belt conveyors of various types for use behind these machines. One of these has a crawler mounting on drive and tail sections for moving. This particular conveyor carries 100 ft of belt in the drive section. tensible belts are largely in the development stage and are not yet in general use. One manufacturer will soon have available a conveyor with a fairly large hopper for receiving shuttle car discharge. This will allow rapid discharge of shuttle cars and slow and more uniform loading of the belt. Train type tandem belts available for some time have not had widespread application.

The relatively small production from continuous machines now available in relation to their cost, limitations to actual continuous operation, difficulties presented by seam impurities and the large percentage of fine sizes produced are problems that still have to be solved. These problems make the choice of continuous mining machines questionable for many applications when compared with newer types of conventional, high capacity loading machines and auxiliary mobile equipment.

To meet the need of a shuttle car adaptable to soft bottom and steep grades, two manufacturers have developed, independently, tractor treaded cars that offer hope to the mine operator who is faced with steep grades and bad bottom.

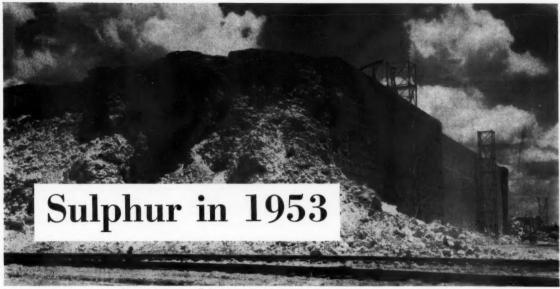
All belt haulage of coal, particularly in new developments, is increasing, although no present installations have been extended to distances comparable to the longer track haulage systems. Use of entry belts in conjunction with main track haulage and increasingly

(Continued on page 81)





Direct loading of mine cars by mechanical loading machines is giving way to the use of shuttle cars, continuing the trend of recent years



Inventories are still low but should increase as new plants get into stride

With Production and Consumption in Balance at New Price Levels, Outlook Is Bright

By W. W. DUECKER and E. W. EDDY

Texas Gulf Sulphur Co., Inc.

THE sulphur picture for 1954 looks good as compared with the 1950-52 period. More sulphur is becoming available. Price ceilings are off. Export shipments are limited by export licenses. But, gone are domestic and international allocations. Actually the sulphur shortage of a few years ago was not as severe as anticipated. It is now realized that the strained position of the sulphur industry at that time was caused by a sudden demand on a limited production capacity. This demand developed through a strong expansion of the chemical and fertilizer industry, a call for sulphur by foreign nations in their post war reconstruction and the demands of the Korean mobilization.

The sulphur industry needed time to bring in new production. At that time, in 1951, there were only seven Frasch process sulphur mines. Today there are twelve. There should, therefore, be no shortage of sulphur. Sulphur may again become tight, but the improvement in production at new and old mines, the development of other sources of supply, and the practice of economies by users of sulphur should all contribute to a balanced situation.

New Mines Opened

Production of sulphur in all forms in 1953 is expected to approximate 6,326,000 long tons, compared with

6,345,000 long tons in 1952. More than 80 per cent of this tonnage, or 5,140,000 long tons as shown in Table I, came from the Frasch mines of Texas and Louisiana. Throughout the year Texas Gulf Sulphur Co. operated its mines at Boling Dome, Moss Bluff and Spindletop as well as its sourgas-sulphur unit at Worland, Wyo. The Freeport Sulphur Co. continued to operate its mines at Hoskins Mound

in Texas and at Grande Ecaille and Bay St. Elaine in Louisiana. It started production at a new mine at Garden Island Bay in Louisiana and it is anticipated that in the near future it also will have a plant in operation at Nash Dome, Tex. The company also is equipping a mine at Chacahoula, La. Jefferson Lake Sulphur Co. mined sulphur at Starks Dome in Louisiana and at Clemens and Long Point in Texas. The Duval Sulphur and Potash Co. mined sulphur at Orchard Dome in Texas. A large surface mine was brought into production during the year when the Ana-conda Copper Mining Co. began mining sulphur from the Leviathan Mine in California. The ore is transported to its new copper mine at Yerington,



Molten sulphur is gathered from producing wells and then piped to storage vats



Sulphur recovered from sour natural gas and refinery gases reached 340,000 long tons in 1953

Nev., where it is burned to make 450 tons of sulphuric acid per day.

Recovered Sulphur

Production of sulphur from sour natural gas and refinery gases, which in 1952 amounted to 248,000 tons, in 1953 rose to 340,000 long tons. This is an increase of 92,000 tons or 37 percent more than in 1952. Sulphur from these sources in 1945 amounted to but 12,000 tons. In 1949 it was 57,000 tons. In 1951 it was 184,000 tons. In 1953 it was 340,000 tons. It has increased approximately 70,000 tons a year for the last four years. In 1951 there were seven plants producing sulphur from hydrogen sul-phide. Today there are 30 and more building. In addition 835,000 long tons of sulphur were obtained from pyrites, smelter gases and acid sludges or about the same amount as in 1952, with about half coming from pyrites. The total domestic non-Frasch sulphur available to industry in 1953, therefore, was 1,175,000 long tons.

Sulphur Consumption Up

The consumption of sulphur in all forms in the United States as shown in Table I was 5,202,000 long tons in 1953 compared with 5,022,000 tons in 1952. Production and shipments have held steady in approximate balance. Inventories are still low but should start to increase in 1954 as the new plants begin to get into their stride. The mineral is used in making many chemicals and products but major consumption is in the manufacture of sulphuric acid. Production of this acid reached an all-time high of approximately 13,200,000 net tons 100 percent, as shown in Table II. This is 854,000 tons or seven percent more than was produced in 1952. This increase occurred in spite of a slight drop in its use by the fertilizer industry, the largest consumer of acid. The Department of Agriculture forecasts

that by the end of 1956, additional phosphoric acid plants would be required, which in turn would consume about 700,000 long tons of sulphur. With such expansion in only one industry, it would appear that any additional supplies from new mines or as a by-product from the gas and oil refineries will be readily absorbed, and the sulphur industry must continue to expand to take care of demand.

Foreign Sulphur

Canada is a large consumer of American sulphur, using it principally in making sulphite pulp. Canada's sulphur consuming industry is undergoing a significant change and there is a desire to use the vast sulphur potential of the Dominion. Smelter gases, for many years, have provided most of the sulphuric acid for the

TABLE I-THE SULPHUR INDUSTRY IN THE UNITED STATES

D. 1		Tons Estimated
Production	1952	1953
Frasch process sulphur Recovered sulphur Surface deposits	248,076	5,140,000 340,000 10,000
Total	5,543,221	5,490,000
Shipments		
Frasch process sulphur Recovered sulphur Surface deposits	229,259	$\begin{array}{c} 5,200,000 \\ 317,000 \\ 10,000 \end{array}$
Total Export shipments Domestic shipments	1,304,154	5,527,000 1,250,000 4,277,000
Total	5,372,641	5,527,000
Consumption in U. S.		
Domestic sulphur shipments Domestic pyrites shipments Imported pyrites By-product sulphuric acid produced by smelters Sulphuric acid produced from hydrogen sulphide Sulphuric acid reconstituted from acid waste slug Liquid sulphur dioxide produced at smelters	418,000 133,000 260,000 60,000 80,000	$\begin{array}{c} 4,277,000\\ 400,000\\ 100,000\\ 275,000\\ 55,000\\ 100,000\\ 5,000\end{array}$
Total	5,024,497	5,212,00

TABLE II—MAJOR SULPHUR CONSUMING INDUSTRIES IN THE UNITED STATES

Net Tons		**
New Sulphuric Acid, 100 Percent: Chamber Contact	1952 2,709,279 9,634,618	Estimated 1953 2,850,000 10,350,000
Total	12,343,897	13,200,000
Ammonium Sulphate: By-product at Coke Ovens At Chemical Plants Total Superphosphate, 100 Percent A.P.A.	803,223 812,795 1,616,018 2,250,000	952,000 575,000 1,527,000 2,200,000
Sulphite Pulp: Dissolving and Special Alpha Grades Paper Grades	600,000 2,364,976	553,000 2,307,000
Total	2,964,976	2,860,000

Canadian fertilizer industry and last year liquid sulphur dioxide made from smelter gases was used by the sulphite pulp industry. In 1952 the reported production of sulphur in pyrites was 254,599 tons and in smelter gases 186,672 tons - totaling 441,272 net tons. Noranda Mines has announced plans to process pyrites to make 18,000 long tons of elemental sulphur, and in addition, to provide gas equal to 36,000 tons sulphur per annum for a chemical company for manufacture of sulphuric acid. Approximately 20,000 tons sulphur was recovered in 1953 from sour natural gas by oil companies operating in Alberta. Because Canadian sour natural gas fields are far from consuming centers, and transport costs are high, only limited substitution of Canadian brimstone for American brimstone appears likely in the near future.

The production of sulphur in Italy during the first half of the year was reported at 105,882 metric tons. This is an increase of nine percent compared with the same period in 1952 and 15 percent compared with 1951. This increase is attributed to the new Italian system of fixed price purchasing based on average production cost. This has encouraged modernization and mechanization of some sulphur mines. But at present Italy is not a large contributor to the world's sul-

phur supplies.

New Sulphur Projects

There has been increased interest in the sulphur deposits of the world. This has led to the formation of a number of companies to exploit them.

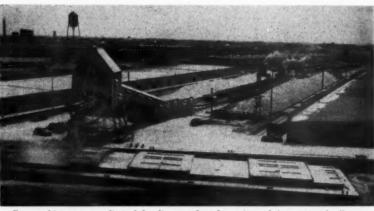
American Sulphur Refining Co. in Mexico.

Azufre Refinados de Mexico in

Mexico. Black Rock Desert Mining Co. at

Winnemucca, Nev. Central Eureka Mining Co. at San Jose, Calif.

Central Minera, S. A., in Mexico.



Export shipments are limited by licenses but domestic and international allocations are gone

Cia Minera Azufrosa, S. A., near Cerritos, Mex.

Continental Sulphur and Phosphate Co. at Thermopolis, Wyo.

Ecuadorian Mining Co., S. A., at Tixan, Ecuador.

Industrias Purace, S. A., in Columbia.

Lone Star Sulphur Co. at Long Point, Texas.

Mexican Gulf Sulphur Co. in Mexi-

Pan-American Sulphur Co. in Mexico.

Sociedad Azufrera, in Antofagasta, Chile.

Sociedad Minera Consoriaco in Chile.

Stanco Sulphur Products Co. in Wyoming.

Standard Sulphur Co. at Damon Mound, Texas.

The Gulf Sulphur Co. of Delaware in Mexico.

The Texas International Sulphur Co. in Mexico.

Venezuelan Sulphur Corp. in Carupano, Venezuela.

Wyoming Gulf Sulphur Corp. in Cody, Wyo.

New Prices Beneficial

Price controls on brimstone were removed by the Office of Price Sta-bilization on March 17, 1953, and the sulphur companies increased their prices from the low levels at which they had been held since January, 1951. Prices rose irregularly, but new prices were all in effect by June 1, 1953. Oil, Paint and Drug Reporter in June listed prices as \$25.50 to \$27.50 per long ton f.o.b. mines and \$28.00 to \$30.50 f.o.b. Gulf ports for export. In January, 1954, this same journal listed the prices as \$26.50 to \$27.50 f.o.b. mines and \$31.00 to \$33.00 f.o.b. Gulf ports for export.

New prices have had the effect of bringing to consuming industries the sulphur they require whether from the mines of Texas and Louisiana or as by-product from natural gas and pyrites. A forecast made about eight years ago indicated that at the prices then prevailing a certain mine would soon close down. But with increased prices this did not happen. The mine continues to operate and adds 200,000 to 250,000 tons annually to American

sulphur supplies.



Freeport operated its wells at Hoskins Mound in Texas and Grand Ecaille, Bay Ste Elaine, La. (above) and brought in a new deposit at Garden Island Bay, La.



You still have to take a look at what is down there

Exploration Geology in Mining

With Advent of New Tools and Methods, Exploration Geology Is on the Verge of a New Era

A NEW stimulus in mineral exploration was evident during 1953. It was brought about largely by a broad application of tools and techniques relatively new to mining geologists. Geochemical prospecting, geophysics, photogeology and research studies related to wall rock alteration and ore localization have received wide attention and general acceptance by mining companies and independent geologists. Discovery of new ore has become increasingly difficult; consequently, indirect methods of securing critical data are playing a significant, and in many instances, a critical role.

Geochemical Prospecting

Rapid advances in geochemical prospecting techniques have resulted in a much wider use of soil sampling as a prospecting tool. Chemists connected with the Geochemical Prospect-

ing Laboratory of the U.S. Geological Survey in Denver have developed successful tests for 15 specific elements including copper, lead, zinc, nickel, cobalt, molybdenum, silver, tungsten, antimony, arsenic, germanium, manganese, niobium, vana-dium and uranium. Descriptions of the trace analytical methods suitable for the above metals and summary descriptions of the tests are included in Survey Circular 161 and in open file reports recently released. The Geochemical Prospecting Laboratory at the Denver Federal Center welcomes visitors who are interested in learning the techniques related to specific tests.

The U. S. Geological Survey deserves a great deal of credit not only for its pioneering work in developing effective laboratory tests and field techniques but also for selling this

By ROBERT H. CARPENTER

Associate Professor Colorado School of Mines

prospecting tool to the mining industry

In the eastern United States several mining companies are carrying out geochemical prospecting studies. In spite of deep residual soil cover in most areas, results are encouraging. Dispersion halos are believed to be effective indications of anomalies at the surface above the general background count of a given region.

In the western part of the country, where residual soil cover usually is less extensive, results have been very gratifying. Not only has soil sampling aided in outlining areas of mineralization such as at Cobalt, Idaho, but in at least two localities specific ore bodies have been discovered by geochemical methods. Information regarding these discoveries is confidential.

It also is of interest to note that geochemical prospecting investigations by mining companies and private individuals are in progress in England, Finland, Australia, and in Canada in the provinces of New Brunswick, Quebec, and British Columbia. Analysis of glacial drift is proving to be of particular value in locating zinc deposits in Canada. At Mt. Isa, Queensland, Australia, two lead deposits were discovered by analyses of residual soil.

The recently developed vanadium test has proved to be of distinct value in prospecting for uranium ores. Vanadium is commonly associated with uranium in oxides. Consequently, the apparent effectiveness of the vanadium test should greatly enhance exploration for these ores throughout the United States. The Survey's discovery that indicator plants can be used to locate uranium mineralization on the Colorado Plateau also will be a valuable tool.

At Tintic, Utah, geochemistry has been applied to country rock sampling in studies carried out by T. S. Lovering and his associates. It is believed to be an effective method in helping to locate mineralization halos surrounding ore bodies when used in conjunction with wall rock alteration evidence.

At the Waite Amulet mine in the Noranda district, Quebec, Canada, geochemical sampling of diamond drill cores has proved to be an effective tool. J. E. Riddell's paper "Techniques for the Determination of Traces of Epigenetic Base Metals in Rocks," published as P. R. No. 239, Dept. of Mines, Prov. of Quebec, Canada, 1950,



The airplane and camera team is of tremendous value to the exploration geologist

contains valuable information concerning rock sampling techniques.

Geochemical sampling of country rock on the surface, underground, and of diamond drill cores offers most promising possibilities. This method of sampling may in many instances effectively enlarge exploration targets, thus greatly enhancing the possibility of discovery, and reducing over-all expenditure.

Geologists are using geochemical prospecting successfully both for reconnaissance and specifically over areas of known or suspected mineralization. In the former, water analyses in extensive drainage areas, controlled geobotanical sampling of vegetation over wide areas, and random soil sampling, particularly along fault zones, are utilized. In the latter, the results of analyses of soil and plant samples collected on a grid system or samples collected on a series of traverses may establish a significant anomaly well above the metal background count of the area.

At present the emphasis is toward detailed comparison of water, soil, plant, and rock geochemical methods and toward closer correlation of geochemical, wall rock, and geophysical data in a specific examination. Relationships between copper content in mineralized rock, in soil, and in vegetation at Ray, Ariz., are clearly described by Otis M. Clarke, Jr., in his recent paper which was published in *Economic Geology*, Vol. 48, No. 1, 1953. This paper deserves study by those interested in these relationships.

Courses in Geochemistry

Both the Massachusetts Institute of Technology and the Colorado School of Mines have established training in geochemical techniques for their students. The latter is beginning research studies related to the use of country rock sampling in exploration.

Probe Drill Holes

One of the most important advances in mining geophysics is the development of radiation devices for probing diamond drill holes. Of these, the scintillation counter unit developed by the Radiation Laboratory of the U. S. Geological Survey appears to be one

of the most effective, and is expected to be in commercial use in the near future. In effect, this type of equipment is used as a direct logging device to record the radioactive content in drill holes. It may also be used effectively in stratigraphic correlation and indirectly to develop structural relationships in much the same manner as gamma ray logging is utilized in oil exploration.



A scintillation counter unit was developed to probe drill holes

Airborne Surveys Effective

Airborne scintillometers now are in general use in prospecting for radioactive materials both by government agencies and in private investigations. Light planes in which this equipment is installed generally fly some 50 ft from the outcrop, and are very effective in spotting mineralized areas.

Aeromagnetic surveys utilizing airborne magnetometers are in wide use throughout the world as a reconnaissance tool. These surveys have been very valuable in exploration for iron ores in the Lake Superior region. Flights commonly are a mile apart and effectively locate areas of mineralization. The dip needle also is used in reconnaissance on the ground in a new area followed by the superdip instrument. Magnetometer surveys on the ground develop the detail related to a

specific ore body. Gravity methods also have proved to be effective in this region, particularly in locating the iron formations.

It has been reported that gravity meters have been used underground with some success in the search for ore in one of the mining districts of the southwest.

A truck-mounted continuous recording magnetometer developed by the United Geophysical Co. is being used effectively in the field. It has the advantage of a continuous record for ground surveys.

In the Bathurst district of New Brunswick, Canada, an airborne magnetometer survey by the Geological Survey of Canada followed by an electro-magnetic survey is credited with the discovery of a large base metal orebody. Geochemistry also is being utilized in expanding the district particularly in the search for zinc ores.

In other parts of Canada, the airborne magnetometer surveys are followed on the ground by self potential, resistivity or other methods in reconnaissance with detailed follow-up studies by the electromagnetic method. It is reported that one of the mining companies is successfully using airborne electro-magnetic units in reconnaissance studies.

Research Bears Fruit

Research in geophysics is progressing rapidly. Some success is reported in electromagnetic surveying at radio frequencies in the field. Considerable research is in progress with this type of equipment.

Stanford Research Institute has pioneered investigations in the field of shallow seismic reflection. If commercial equipment can be developed it will be of great value to mineral exploration in establishing shallow stratigraphic horizons, and unconformity, fault, and bedrock surfaces.

Research in induced polarization and pulse potential is progressing rapidly. This method may become an important tool in exploration in the not-too-distant future.

Photogeology

A third tool in wide use by mining companies is photogeology. Black and white aerial photographs have been of tremendous value to the exploration geologist in recent years, both in time and in money saved. Their prime use in the past has been in field mapping. Geologic data commonly is plotted directly on individual prints and often is transferred to base mosaics. Stereopairs are used in conjunction with ordinary methods of field mapping.

Aerial photos now are being used in a variety of ways in mining. They are of great aid in preparing large scale, detailed property maps, in locating construction materials such as



A new stimulus in mineral exploration was evident in 1953

sands, gravels, clay and quarry rock, and in laying out roads and airfields.

Of more importance in exploration, aerial photographs are being used as a basis of specific exploration projects in the following general sequence: first, as a reconnaissance tool to establish regional structural fabric, intrusive trends, and possible sites of mineralization; second, in the preparation of a geologic map of a possible mineralized area in small scale by an experienced interpreter; third, color photography is utilized to develop a semi-detailed geologic map of a specific area of promise. If the results are encouraging, airborne scintillometer or aeromagnetic surveys are utilized. Finally, detailed geologic work is completed on the ground, aided by geochemistry and geophysics. Needless to say, a reliable stratigraphic section and the identity of specific igneous rocks and alteration types are needed in the interpretation of the photographs in this sequence of steps. Apparently, large areas are being covered effectively in this manner both by oil and mining companies with great saving in time.

Wall Rock Alteration

Research in wall rock alteration by hydrothermal solutions has received strong impetus as a result of the marked contributions made by Lovering, Sales and Meyers, Kerr and others in recent years. A considerable number of geologists with the U. S. Geological Survey, colleges and universities and mining companies visualize the use of wall rock alteration as a key tool in the future of mineral exploration. They are attempting to work out alteration relationships related to specific exploration projects and apply this data to exploration.

A diamond drilling program at Tintic, Utah, designed to test the use of Lovering's application of wall rock alteration and geochemistry to ore exploration in that district, was delayed during most of 1953 but is expected to be completed during 1954. The possible alteration-geochemical halos outlined by him are being drilled to determine whether ore bodies may be present beneath at depth.

Kerr's work on wall rock alteration as related to uranium at Marysvale, Utah, and other areas will be of great aid in uranium exploration in the future

An extensive ore body is reported to have been found in the Noranda District in Quebec, Canada with the aid of alteration studies.

The use of wall rock alteration data in mineral exploration certainly is in its infancy, but offers exceptional possibilities for the future, particularly if used in conjunction with geochemistry and geophysics. Much more research is needed before wide application of this tool can be expected. Probably the effective use of alteration in exploration will require laboratory studies in conjunction with field work. The exploration geologist using wall rock alteration as a tool

in the future will need a sound background in chemistry, petrology, and related fields.

Research Activities

Research activities in mining progressed with added stimulus during 1953. Several mining companies established research laboratories or "farmed out" research projects to colleges and universities. Anaconda Copper Mining Co. was a pioneer in geo-logic research. Its laboratory at Butte, Mont., under the able guidance of Charles Meyers and Reno Sales, has been in operation since the early war years. They are continuing intensive investigations embracing fundamental research as well as applied research related to specific problems in geology, mining, and metallurgy. Their studies include problems of ore genesis, and in addition detailed petrographic studies related to outside examination activities of Anaconda's exploration staff. Research in geophysics and the application of geophysical methods to exploration problems is being carried on outside Butte under the direction of the exploration de-

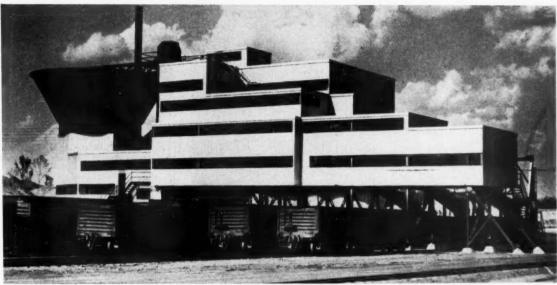
Many mining companies are securing the aid of colleges and universities in research problems, both in fundamental and applied phases.

Research under the supervision of mining companies, colleges and universities, the U. S. Geological Survey and other government agencies, is giving exploration geologists answers to many factors related to ore localization, both primary and secondary, and is enhancing the development and refinement of exploration tools.

Exploration in mining with the advent of these tools and techniques may be in a stage similar to exploration in oil in the early '20s when geophysics was first used effectively.



A careful ground survey is the basis of any good map



The modern cleaning plant is the industry's shining symbol of a uniform and irreplaceable fuel

Coal Preparation in 1953

Uniform Product Becomes as Important as Clean Coal.
Industry's Emphasis on Preparation Doubles in
Last Decade

By J. B. MORROW

Alford, Morrow and Associates Consulting Mining Engineers

OVER the last ten years mechanical cleaning has moved ahead considerably faster than mechanical mining. In 1943, 50 percent of the coal produced underground was loaded mechanically; by 1952 this figure had risen to 76 percent. During the same period mechanical cleaning advanced from 25 percent to 49 percent of total coal production.

Changing pattern of coal consumption are bound to affect mechanical cleaning. The decline in railroad tonnage does not have any pronounced effect, but the decline in domestic consumption of prepared sizes and the increase in the use of coal by public utilities tends to simplify preparation problems. On the other hand, the generally tighter specifications for metallurgical coal, particularly in those areas where low sulphur coals are getting scarce, serve to further complicate preparation procedures.

In general, looking to the future, more care is going to have to be taken so that the cost of preparation is in closer balance with the added actual value for purposes of power generation. Low cost Btu as delivered is

going to be of increasing importance for this market.

Review New Ideas

Standard coal cleaning devices are so well known that it does not seem necessary to catalog here. It is intended rather to indicate some of the newer ideas in the application of these and other devices.

There has been an increasing interest in the use of screens with heated screen cloth for fine screening. This has been brought about mainly by the increased pressure from State and Federal Mine Bureaus to do more sprinkling underground so as to lay the dust.

Use of the cyclone as a cleaning unit is attracting more attention. Pennsylvania State University, in collaboration with the Coal Operators Associations of Central and Western Pennsylvania, is conducting research on the possibility of producing a salable pyrite from coal refuse using cyclones as concentrating units. Cyclones are also being used to partially dewater fine coal prior to wet screening.

For the cleaning of the finer sizes of coal, it is very probable that some of the European air pulsated jigs using either natural or artificial feldspar beds will be introduced into the United States in the near future. These jigs are a refinement of the old Luhrig jigs which were used here in the early part of this century. The method of pulsation has been much improved as has the draw-off, resulting in a much greater capacity.

Wilmot Engineering Co. has introduced the Daniel's vessel for heavy density separation. This is based on the theory of the Hydroseparator.

Blue Diamond Coal Co. is installing a Tromp heavy density vessel which is planned to treat lump coal up to 14 in. in size, a marked deviation from the old practice of only cleaning slack or nut slack.

Nelson L. Davis Co. has introduced simplified methods for the recovery of magnetite in heavy density circuits. In other quarters attempts are being made to use sand as the medium in a drum type vessel. Consideration is again being given to the use of flotation tailings and crushed refuse as a separating medium—a return to the old practice of the Wuench cone.

Some of the most refined preparation methods are being used in captive plants of the steel companies. The practice of making a double gravity separation and crushing the middling product for retreatment on concentrating tables with classified feed makes for a very exact separation, though somewhat too costly for the ordinary commercial operator.



Froth flotation treatment of coal became more widespread

Froth flotation for treatment of coal slimes seems to be on the increase. Denver Equipment Co. furnishes the majority of the units now in use on bituminous coal. Stream pollution problems will probably accelerate the trend toward recovery of fine coal which is now being wasted.

Roberts and Schaefer Co. is doing development work on a new amalga-

mation process somewhat on the order of the old Trent system but using greatly reduced quantities of oil. Other experimental work is being done by individual coal companies on this same problem.

With the increasing efficiency of air cleaning, it is particularly interesting to note a trend toward heat drying of damp—not wet—fines prior to air cleaning. Mounting use of coal by public utilities, should strengthen and prolong this trend, particularly in those cases where a black and white separation is all that is desired. This indicates one road toward cheaper Btu's as compared to all wet cleaning with its attendant water settling and drying problems.

Water Settling

As a new approach to the problems of drying and filtering one of the most noteworthy ideas of 1953 was the introduction of the horizontal filter as developed by the Oliver United Filter Co. some years ago. The Rochester and Pittsburgh Coal Co. pioneered in this first installation, in an endeavor to combine the centrifugal drying and filtering processes into one operation at a lower cost.
One of the principal objections to centrifugal drying, apart from high maintenance costs, has been size degradation. This has been particularly troublesome in the use of fine coal for steam generation. In the case of the more friable coals, degradation increases the problems of filtering and water settling.

McNally-Pittsburg Mfg. Corp. brought out a new centrifugal drier, the Dryclone; easier accessibility is particularly claimed for this machine.

American Cyanamid Co. introduced a new proprietary flocculant, similar to those used in England for many years, with the idea of simplifying present installations, where starch and caustic soda are used.

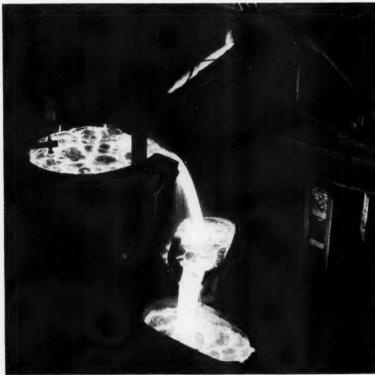
Heat Drying

Increasing use of coal for power generation has naturally focussed attention on delivered BTU values and this in turn has caused an increased interest in heat drying. The McNally Pulso drier, the Raymond flash drier, the Multi-Louvre and the Baughman driers all seem to be finding more applications. The Dorr Co. put on the market a new drier which works on the principle of fluidized solids. Perhaps the major new development in heat drying was the new drying plant for Texas Lignite. This drying unit was developed by V. F. Parry at the U. S. Bureau of Mines laboratory in Denver and is a part of the new Alcoa lignite development where it is planned to first dry the lignite and then carbonize it. The resultant char will be burned under boilers leaving the tar and other by-products for further processing.

Miscellaneous

In the way of instrumentation, an interesting development is a new method for quick determination of suspended solids based on measurements of Beta or Gamma rays from radioactive material.

(Continued on page 111)



Some of the most refined preparation methods are being employed to produce coal for metallurgical uses



Small individual units of the aggregates industry collectively represent the largest part of the industrial minerals field

Industrial Minerals

Many Producers Enjoyed Boom Year and Several Nonmetallics Remained on Critical List

> By JOSEPH L. GILLSON E. I. du Pont de Nemours & Co., Inc.

THE Government's purchase and exploration program for critical domestic ores has been extended two years. Nonmetallic minerals still considered to be critical are asbestos, beryl, columbite-tantalite and mica. At least two purchase contracts made for fluorspar still have a long time to run. The producers of many, if not most, of the industrial minerals enjoyed a boom year in 1953. One, fluorspar, got caught in the same storm that has hit the lead-zinc industry, namely, a production (largely foreign) highly stimulated by the Government's stockpile buying, the output of which has swamped the normal market, now that the Government has stopped buying and consumers are trying at the same time to reduce stocks.

In order to grasp the relative importance of members of the industrial minerals family, the following figures for 1950 are instructive. (This is the last year for which figures for all are available.)

Of all other industrial minerals, only sulfur exceeded \$100,000,000 in gross sales in that year. Phosphate rock was the only other unit to exceed \$50,000,000 in 1950.

AGGREGATES—As shown above, by far the largest segment of the industrial mineral field is included in the broad term of "aggregates," which includes both coarse and fine aggregates used in concrete and in asphalt roads, and as ballast and "riprap," and hence means sand and gravel, and crushed stone.

Pit and Quarry Magazine estimates that in 1953 sand and gravel production gained three percent over 1952 to reach 433,000,000 tons. Crushed stone production was off two percent to 292,000,000 tons. The individual units of this tremendous industry command no mention in an annual

review, but collectively they represent the greatness of the efforts and achievements on this continent. In 1953 the U.S. spent \$34.7 billion on new construction of which \$5.5 billion was for new highways. The magnitude and number of the construction projects is so vast as to be breathtaking, including several atomic energy plants, 40 dams, a score of great and beautiful bridges from Jacksonville and Tampa, Fla., to Coos Bay, Ore., Philadelphia to San Francisco (the latter tied up most of the year in local bickering), and the spectacular causeway called "Canso" connecting Cape Breton Island with Nova Scotia. This latter little item involved 9,000,000 tons of rock, filling up the ocean which in the center of the channel was 185 ft deep. Other great bridges building or being planned in 1953 are at Delaware Water Gap, Buffalo, Toledo, Everett, Washington (Snohomish), Milwaukee, Chicago, Seattle, Cleveland, New Orleans, San Juan (Puerto Rico), Kansas City, Savannah, Friar's Point, Miss. (about 50 miles south of Memphis), and Louisville has two new crossings of the Ohio planned. The number and complexity of the highways finished in 1953, started or ap-

Gross Dollar Sales x 1000	Percent Total Sales Industrial Minerals
292,559 537,652 89,676	21.28 16.05 29.49 4.92 4.54
	76.28 23.72
	Dollar Sales x 1000 387,911 292,559 537,652 89,676 82,847 1,390,645

proved in the year, are almost beyond tabulation. Boston opened its Fitzgerald expressway. New York has 180 miles of its "Thruway" under construction and contracts let on the remaining 195 miles, Connecticut, Massachusetts and Maine each have expressway projects, New Jersey was pushing its Garden State Parkway. a \$285 million job, with the energy it had used on its turnpike; Ohio had all of its turnpike under contract at the end of the year, as did Indiana. Pennsylvania is extending its turnpike east, and Philadelphia is picking up with its Schuylkill expressway, while the state is planning a by-pass around Philadelphia to Trenton, where 33 miles of construction will cost 50 million, not counting a new bridge over the Delaware. Maryland has been busy with its Baltimore-Washington expressway, and a new section of the Annapolis by-pass including the Severn River Bridge. Florida was tied up with a local argument as to the location of its Jacksonville-Miami turnpike, but to confound the critics, has started one from Miami to Fort Pierce, while Georgia authorized an expressway from Cartersville in the northwest to the Florida line. Oklahoma finished its "Turner Turnpike" and started talking about three extensions. Texas, after finishing 65.7 miles of expressway, had 9.4 more miles under construction. Detroit was hard at work on its John C. Lodge and Edsel Ford throughways in the city, and the state had plans for one down to Toledo, and another west across the state. California, which outdoes in highway construction every other member of the family of states, finished the most complicated interchange in existence in Los Angeles and had 52 major projects under way during the year, including four or five freeways around Los Angeles, the Arroyo Seco bridge in Pasadena, and the Bay Shore and East Shore freeways in San Francisco. Oregon was rebuilding the Columbia River highway and finished an expressway from Portland to Troutdale and was working on one from Portland to Salem. Washington was building a four-lane road at Snoqualmie Pass and was bridging the Columbia at Pasco, West Virginia after settling a court fight that cost a million dollars, has now awarded contracts on its \$96,000,000 north-south road. Three huge construction jobs are

Three huge construction jobs are under way, the Everglades flood control in Florida, a \$208,000,000 project, the Kitimat aluminum development in British Columbia and the Ontario Hydro project at Niagara Falls, not to mention such minor jobs as the new Lincoln Tunnel in New York, the Baytown tunnel in Houston, the Nuuanu Pali tunnel in Honolulu, the Toronto subway and the Philadelphia airport. The size of some of the steam power plants finished or build-

ing is amazing. The Johnsonville, Tennessee, steam plant of the TVA had its six 125,000 kw units in operation in February, 1953, and the TVA was working on the Widows Creek plant at Guntersville Lake, in Alabama, the Colbert on Pickwick Lake, also in Alabama; and the Gallatin plant on the Cumberland which will have two 250,000 kw units, the largest ever built, has started construction.

At Rockdale, Texas, the Texas Power and Light Co. finished for the Aluminum Co., its big steam plant which burns lignite for fuel. Philadelphia Electric added two new 125,000 kw generators to its Delaware Station.

Even to list and identify the 40 dams under construction is beyond the limits of this review. Some 11 major dams were finished and dedicated in 1952, but that only freed men and equipment for other jobs. There are the four major dams on the Missouri-Gavins Point, Garrison, Oahe and Fort Randall; two big ones on the Columbia-McNary and Chief Joseph; Cabinet Gorge on the Clark Fork River in Idaho, Canyon Ferry in Montana, Table Rock on the White River in Missouri, and Tuttle Creek on the Blue River in Kansas, which was started in 1953 after 14 years of fighting by the local residents, the Jim Woodruff and Buford dams on the Chattahoochie, Demopolis on the Tombigbee in Alabama, Conemaugh on the Ohio near Pittsburgh, St. Anthony Falls on the Mississippi, Blakely Mountain and Degray on the Ouachita, Texarkana on the Sulphur. Ferrells Bridge on a tributary of the Red, Ten Killer Ferry on the Illinois River in Oklahoma, the Jemez Canyon in New Mexico, and several in Texas and California.

None of the above describes any feature of the aggregates industry itself, but it paints a broad picture of what it is doing and what it has yet before it, in so robust an economy as that of North America!

Actually there were some newsworthy developments in the aggregates industry. Heavy media separation to eliminate soft shale from gravel or crushed rock was first tried by a Canadian operator for the Canadian Air Force a year ago and was then adopted by a large producer of Ohio River sand and gravel, the Dravo Corporation at Pittsburgh, and has now been adopted by an aggregates producer at Owatonna, Minn., and by Kaiser Aluminum and Chemical Co. at their dolomite plant at Natividad, near Salinas, Calif. Cone and cyclone classifiers are being adopted more widely to increase the recovery of fine sands, notably by the Pequannock Sand and Gravel Co. of New Jersey and the Carolina Aggregates Co. of South Carolina, Mechanical scrubbers and attrition machines are being used to eliminate soft particles by others, particularly in California. Jet

piercing, in place of rock drilling, was tried by a granite quarry in Georgia during the year. The California division of highways established a "sand equivalent" test to detect claylike materials in fine aggregates. Dust control is being improved, especially by a big Oklahoma operator.

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ANORTHOSITE—The first use of anorthosite, other than for a building stone, is under way at the Laramie plant of the U. S. Bureau of Mines, in Wyoming, producing alumina from the feldspar in the rock.

ASBESTOS — Exploration and development in this field of industrial minerals continued through the year at a very high degree of activity, although prices and production have been off slightly.

Two excellent general reviews of the industry were published, one, a Materials Survey Report, by the National Securities Resources Board, and written by Dr. Oliver Bowles, a consultant for the U.S. Bureau of Mines. This is available from the Government Printing Office for \$1.25. The other review is called "Asbestos Fact Book" and is published by Secretarial Service of Philadelphia, and sells for 25 cents. In his review Dr. Bowles brings out the important fact that although the U.S. uses one-half of all asbestos produced, only six to eight percent of the production comes from the U.S. itself.

United States 1953 production is estimated at approximately 54,000 tons, most of it coming from Vermont.

The DMEA advanced money during the year to several producers in the Globe district in Arizona, where iron free, long fibre grades are recovered. Bell Asbestos, Metate Corp., and the Bear Canyon Mining Co. are producers. Exploration on the San Carlos Indian reservation is also under way. Chrysotile asbestos has been found in Madison County, Mont. A deposit near Victorville in San Bernardino County, Calif., is being developed under the name of the Conda properties.

Canadian production will probably be about 10 percent less than that of 1952. In British Columbia, Cassiar Asbestos is producing from Mc-Dame Lake and Johns Manville has optioned claims in the same area. A new find is near Lilloet, B. C. and Western Asbestos and Development Ltd. is working in Penticton and Revelstoke also in B. C. A new deposit in the Athabaska Mining District of Saskatchewan is reported by the Lafayette Asbestos Co. and Johns Manville has acquired claims in Reeves Township in Ontario as well as another group east of Matheson, Ont., on which operation continued through 1953. Colonial Asbestos was drilling on adjoining claims in the same area.

In Quebec, at least six companies have been very active. Johnson's

Asbestos Co. has a new 4000-ton mill at Blake Lake. Dominion Asbestos at St. Adrien de Ham made its first shipment from a new 2200-ton mill. Asbestos Corp. which reported an all time high in net profits for 1952, has four producing mines in the Thetford area and will have its new Normandie mine in operation in 1954, on which it spent over \$10,000,000. The mill will use the new Aerofall equipment. Provincial Asbestos at Coleraine is increasing its capacity from 500 tpd to over 1000. Johns Manville has invested over \$20,000,000 of new money and will have, by 1956, a mill capacity of 14,000 tpd. One fourth of the capacity will be in operation in 1954. United Asbestos sold its Black Lake Property to Lake Asbestos Co., a subsidiary of American Smelting and Refining Co. Development plans call for an expenditure of \$15,000,000 to drain Black Lake and to put in equipment to mine and mill 5000 tpd. Lafayette Asbestos Co. has drilled a deposit in Cranbourne township said to contain 35,000,000 tons of workable

Production in Quebec for the first eight months of 1953 was 586,000 tons of rock.

In his presidential address before the Chemical, Metallurgical and Mining Society of South Africa, Mr. M. C. G. Meyer outlined the growth and methods of the asbestos industry of South Africa and Rhodesia. The mineral has now replaced gold as the mineral product having the greatest total value in Southern Rhodesia. Chrysotile comes from large belts of serpentine in the eastern Transvaal and Swaziland and from the central portion of Southern Rhodesia, notably Shaban and Mashaba. Amosite and the Transvaal blue asbestos come from the banded iron stones of the Pretoria and Griquatown Series. The producing district is southeast of Pietersburg in a belt from Chuniepoort to Lydenburg. Blue asbestos is also mined in the Cape Province, where the high quality "Cape Blue" is produced. In the Union, a new plant to process blue and other asbestos has been built near Pietersburg by the International Asbestos and Mineral Corp. The mill will use an Italian machine called the Marchioli mill which reduces potential damage to the

For 1953 in South Africa the estimated production of amosite should be 40,000 tons, crocidolite at about 40,000 tons and chrysotile at about 20,000 tons.

Although not strictly falling within the Union, one of the most interesting discoveries was a substantial deposit of a "super-crude" fiber in Bechuanaland which fetched the remarkable

price of between £1000 and £1250 a ton (about \$2600 to \$3250).

In Southern Rhodesia, Rhodesia Montelo Asbestos, Ltd. is developing a mine in the Vukwe hills near Shabani while a gold mining company called Coonation Syndicate, Ltd., has acquired a 50 percent interest in the Ratanyana Asbestos Venture. The company called Lustlite de Mocambique, owns the Kilmarnock mine in Southern Rhodesia and ships asbestos to its works at Dondo in the Portuguese Colony. Rhodesian Asbestos, Ltd. has a new mine and mill that will start operation in October, 1954.

In Australia, the company, Australian Blue Asbestos, Ltd., is mining from deposits in the Hamersley Ranges, 700 miles north of Perth in Western Australia. Asbestos Columbianos, S. A., a Colombian company in

that formerly purchased crude barite

In Missouri, three new washing and jigging plants have been constructed during the year and are currently in operation. The Baroid Sales Division, National Lead Co. is expanding its production facilities in Arkansas.

In Arkansas, a plant was completed in 1953 by Rubarite, Inc., for the manufacture of a new product which is composed largely of a mixture of finely ground barite and latex. This product, which carries the trade name of Rubarite, is in demand as an additive to asphaltic road surfacing materials to which it imparts a number of desirable properties.

A new barite industry in Montana was started by the Finlen and Sheriden Mining Co. on deposits worked



Barite is mined by open-pit methods in Arkansas

which Johns Manville has an interest, is prospecting a new asbestos area in the department of Antioquia, Colombia.

Asbestos fiber prices have remained relatively unchanged throughout the year and were about the same as for 1952.

BARITE—The world production of barite was approximately 2,100,000 short tons in 1953. The United States produced some 50 percent and consumed approximately 56 percent of the world output. Domestic production is principally from Arkansas, Missouri, Nevada and Georgia. Germany, Canada, Italy, Greece and Yugoslavia are major foreign producers. The consumption of barite product in the United States is approximately 65 percent by the drilling industry and the balance by the chemical, paper, rubber and other industries.

The competition from titanium pigment has effectively closed all three of the northeastern lithopone plants

underground, near Greenough, in Missoula County. In Washington, the Manufacturers Mineral Co. is working a deposit in Stevens County, near Addy. In New Mexico, the Mex-Tex Mining Co., operating east of San Antonio is milling between 120 to 140 tons of a barite-galena ore. In Nevada, Barium Products, Ltd., a subsidiary of the Food Machinery Co., has opened the Mountain Springs mine, 20 miles south of Battle Mountain. The product is shipped to the firm's chemical plant at Modesto, Calif. At Mesa, the Arizona Barite Co, is working a group of claims in the Granite Reef mining district, producing 3000 tons of barite per month.

Move Mills

In view of the low cost of foreign barite, delivered to any Eastern port of entry, there has been a major move, by the suppliers to the oil fields, to build crushing and grinding plants on the Gulf Coast at Harvey, Louisi-

ana, New Orleans, Corpus Christi, etc. This move has seriously reduced the shipments of barite ore from the former sources in Georgia, Tennessee, and Missouri.

Build Grinding Plants

Four new dry-grinding plants have been completed on the Gulf Coast in 1953 by The Baroid Sales Division of the National Lead Co., The Milwhite Co., and the Magnet Cove Barium Corp. Ore for these plants is largely derived from foreign sources, principally Canada, Yugoslavia, Mexico, and Italy. The product is utilized in the oil well drilling industry in the Gulf Coast area. The importation of crude barite ore has increased substantially in 1953.

Some of the domestic producers of barite have successfully lowered the cost of production by the installation of the Dorrclone, spirals, tables and flotation for the recovery of natural fines formerly lost in the overflow waters.

BERYL-This mineral is still on the critical list. The General Services Administration maintains buying depots at Franklin, N. H., Custer, S. D. and at Spruce Pine, N. C. At Rapid City, S. D., the U. S. Bureau of Mines started a flotation plant to treat non-lithium bearing beryl ores, and will produce concentrates from ores carrying as little as 0.1 percent beryl. Mica is removed, presumably by an amine float, and then beryl and feldspar are floated together. The tailings may contain tin and tantalitecolumbite which can be recovered by gravity methods. How the feldspar and beryl are separated is not described.

Of the beryl requirements 90 percent are imported. The D. M. P. A. signed a contract with a Brazilian firm, Proberil S. A. to buy \$150,000 worth of beryl at a price of \$50 per metric ton unit of BeO. The reserves in Minas Gerais and Bahia, Brazil, have been estimated at 40,000 tons proven, with a possible reserve of 200,000 tons. The Beryllium Corp. has been investigating beryl deposits in Surinam and is reportedly encouraged with findings at Herminadorp on the Marowijne River in that colony.

CERAMICS-A summary of developments during 1953 in this field were

prepared for this review by H. G. Schurecht of the Champion Spark Plug Co. and Hans Thurnauer of the America Lava Corp.

The 1953 Purdy award was given to Floyd Hummel by the American Ceramic Society for his work on "Thermal Expansion Properties of Some Synthetic Lithia Minerals."1

Heating petalite above 680° C. results in the formation of Beta Spodumene which has a very low thermal expansion being slightly negative in some cases. As a rule, a glass produced by melting a mineral has a lower expansion than the mineral. Unlike most other minerals, a glass formed by heating petalite above 1356° C. has a much higher expansion than the mineral. By firing these types of bodies below 1356° C. and above 680° C. new ceramic bodies with unusually high resistance to thermal shock have been developed.

Uranium oxide has long been used as a coloring agent in ceramic glazes, glasses, and bodies. A new use for uranium oxide has been developed, namely, as a refractory.2 Uranium dioxide refractories are fired in a hydrogen furnace using molybdenum heating elements. Such refractories have new unusual properties.

The U.S. Bureau of Mines has developed a variety of synthetic mica compositions, which are formed into tiny mica flakes by solid state reactions. These synthetic mica flakes do not replace natural mica sheets, but are on the way to become important raw materials for improved glass or phosphate bonded mica products, because they exhibit superior dielectric properties over natural mica flakes.

A new ceramic composed entirely of synthetic fluorine mica, prepared by hot pressing techniques, has been developed.3 This material compares well with fused silica and ultra-low-loss steatite as electrical insulators.

Low loss electrical ceramic insulators have been prepared with the mineral wollastonite.4 Some of these bodies meet L-8 and L-9 government specifications for electrical low loss insulators.

Molten titanium metal is extremely reactive. When melted in oxide refractories, a solid solution of oxygen metal is formed. Carbon and nitrogen, likewise, react with titanium. Fluoride refractory bodies have been developed for melting titanium metal.5 Fluorides have proven better for this purpose than oxide refractories since the fluorine ion has little or no solubility in titanium.

The successful development of a revolutionary production system, known as "Project Tinkertoy," was announced jointly by the Navy's Bureau of Aeronautics and the National Bureau of Standards. It turns out complete units from standard electronic components which are mounted on standard ceramic wafers. Ceramics in preference to plastics were chosen because they afford absolute rigidity under all temperature conditions and economy in manufacture.

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Magnedur magnets, made by a powder metallurgy process from a mixture of barium and iron oxides, are now in commercial production. This ceramic material, containing no critical materials, such as nickel, cobalt, tungsten, or chromium, has excellent permanent magnet qualities. Its high resistance permits its use in highfrequency fields without undesirable

CLAYS-42,193,221 short tons of clays of all kinds were sold or used by producers in the United States in 1952 which was a small decrease below 1951. Because of the strength of the building industry, these figures were probably exceeded in 1953. Of the total used, heavy clay products account for over one-half of the volume, but much less than half of the value. White ware is the second largest outlet, followed closely by refractories.

Bentonite continues to grow in importance, largely used by the oil industry for rotary drilling muds and for filtering, although foundries use substantial tonnages.

As in previous years, the Spruce Pine District of western North Carolina accounted for the production of about 25,000 tons of primary kaolin. All of this output came from the Alaskite deposits which are common to the District. About 200,000 tons of kaolin was mined which, after refining, yielded 12 percent of marketable material in the form of chinaclay and five percent of dry-ground mica. Four hundred tons of halloysite was mined and refined and sold to the ceramic trade. Of the kaolin marketed 16,000 tons went to the potteries and chinaware industries and the balance, 9000 tons, were consumed by the manufacturers of fiber glass.

A clay minerals conference was held at the University of Missouri on October 15-17, 1953, on the subject of "The genesis of clays and related minerals.

CORUNDUM AND EMERY-A plant for the production of grain corundum has been completed in South Africa by the Transvaal Corundum Co. Ltd.

A new product "Emeri-crete" which makes a slipproof floor is being manufactured in Peekskill, N. Y., by the Cortland Stone Corp. This material uses crushed emery bearing rock, quarried from the long-known Peekskill emery deposits, mixed with con-

DIATOMACEOUS EARTH-The 1953 production in the U.S. is estimated to have exceeded 300,000 tons. Deposits in the Harper-Westfall district of northern Malheur County, Ore., were opened up by a newly formed company. Another relatively

¹ American Ceramic Society Bulletin, 32 (5), 190 (1953).

² R. E. Corwin and G. B. Eyerly, "Preparation of Refractories from Uranium Dioxide," J. Amer. Ceram. Soc., 36 (4), 137-39 (1953).

³ J. E. Coneforo, R. A. Hatch, R. A. Humphrey, and Wilhelm Eitel, "Synthetic Mica Investigations," J. Amer. Ceram. Soc. 36 (9), 286-94 (1953); 36 (10), 341-348 (1953).

⁴ William M. Jackson II, "Low Loss Electrical Bodies from Wollastonite," Am. Ceram. Soc. Bulletin, 32 (9), 396-398 (1953).

⁵ "Investigation of Refractories Suitable for Melting Titanium and its Alloys." W.A.D.C. Tech. Report 53-91, Armour Research Foundation, Illinois Institute of Technology, July (1953).

new operation is in Nevada, where a deposit called the Chick Bed, at Fernley, east of Reno, is being worked.

The industry has been setting unusually high standards for dust control in mills and quarries.

DOLOMITE—The Kaiser Aluminum and Chemical Corp. has deepened its large open pit at Natividad, near Salinas, Calif., and it uses a heavy media plant to clean the dolomite.

FELDSPAR AND NEPHELINE SYENITE—The American Encaustic Tiling Co. has purchased 85 percent of the stock of the United Feldspar and Minerals Corp. It then sold its quarry and plant at Oxford, Me., to Bell Minerals Co., of Kentucky, and its Deer Park mine near Spruce Pine, N. C., to New York interests. The Clinchfield Sand and Feldspar Corp. of Baltimore has been sold to the Harry T. Campbell Sons' Corp. of Towson, Md.

International Minerals and Chemical Corp. bought the Consolidated Feldspar Corp. and all its plants a year ago. At Kona, N. C., this company works that variety of granite which carries almost no iron bearing minerals which is called alaskite, and treats it by flotation to produce from 700 tons of daily feed about 250 tons of glass or pottery grade feldspar, 120 tons of glass sand, and about 20 tons of mica concentrates. Oversize tailings are sold as commercial sand. Two other feldspar plants in North Carolina use froth flotation for concentration, both of Spruce Pine. capacity of the plant at Spruce Pine belonging to International Minerals has just been increased 50 percent. The other plant belongs to the Feldspar Flotation Co.

International Minerals has announced a wide-range expansion program including three new plants, one in Connecticut, another at Blue Mountain, Ont., producing nepheline syenites, and a third at an undisclosed location.

The production of nepheline syenite in Ontario totaled 85,500 tons in 1952, valued at \$1,116,500.

FLUORSPAR-Statistics for the first six months of 1953 show at a glance the main difficulty with the fluorspar industry-overproduction. The U. S. Government stimulated output both in the U.S. and abroad, buying large quantities for the government stockpile and preparing for the much discussed "third round of aluminum expansion" which now according to Defense Mobilizer Arthur Flemming, as quoted in the Wall Street Journal for December 24, 1953, "We're not going to give the green light for further aluminum expansion unless the Defense Department is willing to stand back of its requirement figures." He explained further that Deputy Defense Secretary Roger Kyes has expressed skepticism concerning the total aluminum require-

ments for military purposes. The "Third Round" calls for 210,000 tons of additional aluminum capacity above the 1.550,000 tons now installed or building; 210,000 tons of aluminum will require only 16,000 tons of acid grade fluorspar, which is less than half of the expected output of the big flotation plant building at the Marine Terminal in Wilmington, Del., with U. S. Funds, by the St. Lawrence Corp. of Newfoundland. At year's end this plant was not yet finished. The Government has guaranteed purchase for stockpiling of all of its output up to 150,000 tons of concentrates. If there was overproduction before, the excess will be increased greatly when that suppply comes on the open market.

The Government statistics are shown below.

These figures show that there was

more fluorspar imported than was produced domestically, and the country exporting the most to the U. S. is Mexico. This situation reflects the flush output of the newly discovered deposits in Coahuila, which were described in these columns a year ago. There has been a healthy reduction in stocks at consumers plants.

The Illinois-Kentucky district which still supplies the largest share of domestic production, and which is facing severe competition from the Mexican supplies which reach middle Western markets, suffered from major strikes during the late summer. The Minerva plants were idle for six weeks and those of Ozark-Mahoning for ten weeks. Hourly increases up to 13 cents an hour were granted, although the majority of the increases were less.

In spite of the difficulties there was

SALIENT STATISTICS OF FINISHED FLUORSPAR IN THE UNITED STATES, 1950-1952, AND FIRST TWO QUARTERS 1953, IN SHORT TONS

Period		Ship- ments	General imports		Industry stocks at end of period						
	Produc- tion	from mines ¹	(re- ceipts)	Consump- tion	Consumers' plants	Domestic mines	Total				
1950	283,500	301.510	164,634	426.121	164.685	19,038	183,723				
1951	341,300	347.024	181,275	497.012	169,126	13.283	182,403				
1952 1953 :	346,315	333,769	352,503	521,500	252,117	25,522	277,639				
1st Otr	78.308	69,944	72.554	149.533	213,259	33.849	247.108				
2nd Qtr	84,073	88,718	92,899	159,745	195,923	29,204	225,127				

¹ Comprises shipments to domestic and foreign consumers and to National Stockpile.

GENERAL IMPORTS (RECEIPTS) OF FLUORSPAR INTO THE UNITED STATES, 1950-52, AND FIRST SIX MONTHS, 1953, IN SHORT TONS (Source: U. S. Department of Commerce)

Date		Africa	Canada (includin New- foundland		ining more Germany	than 97	percent Mexico		fluoride Total
1950			12.163	560	8,495	7.311	5.306	9.653	43,488
4 4 4 40 -4		632	15.289	849	14.327	6,492	3,819	11.583	
d Charles			13.858	1,120	28,134	18,049	42,234	24,587	127,982
1953				-,			, , , , ,		
six :	months)		10,320	359	18,139	19,076	26,955	12,132	86,981
			C	ontaining	not more	than 97	percent	calcium	fluoride
1950			2.000	2.212	21.129	2.411	67,745	25,649	121.146
1951			6.171	566	34,747	5.312	60,206	21,282	128.284
1952			4.817		32,317	12,354	132,868	35,100	224,521
	(1st	.,	-,					*	
six	months)	1,701	1,243	105	1,841	2,638	65,169	5,775	78,472

CONSUMPTION OF FLUORSPAR (DOMESTIC AND FOREIGN) IN THE UNITED STATES, 1950-1952, AND FIRST TWO QUARTERS OF 1953, BY INDUSTRIES, IN SHORT TONS

Date	Steel	Hydro- fluorie acid	Glass	Enamel	All other	Total
1950	240,802	124,440	33,440	7,723	19,716	426,121
1951	276,654	151,698	35,505	6,736	26,419	497,012
1952 1953 :	271,759	178,265	34,460	5,142	31,874	521,500
1st Qtr	78.581	49.342	8.873	1,566	11.171	149,533
2nd Qtr	78.229	60.547	9,238	1.621	10.110	159,745
Total	156,810	109,889	18,111	3,187	21,281	309,278

much activity in the area. Alcoa installed a new boiler and doubled its power plant capacity. Minerva, which had purchased the Crystal Fluorspar Co, installed a new flotation plant and in their No. 1 mine ran a haulage drift 420 ft long. It will be equipped with a 30-in, conveyor belt. Alcoa has been drilling in the Hobbs Creek ing area of Pope County, and is preparing the Eagle-Babb mine near Salem, Ky. for operation, but is curtailing at the Hutson mine. Leasers at old Nancy Hanks mine found a high grade 12-ft vein on the 250-ft level. Ozark-Mahoning had a new shaft 710 ft deep sunk in their Oxford tract, and new shafts were in progress also at the Scott property in Pope County, Ill., and at the Wright Mine, near Lola, Ky. The famous old Rosiclare mine was put up for sale. At the year's end, most of the operators in the district had joined in a petition for a hearing before the U. S. Tariff Commission on an increased tariff rate on acid-grade fluorspar and for the establishment of import quotas.

Blended mixtures of flotation concentrates, limestone and gravel type fluorspar, normally shipped to steel mills from the Kentucky-Illinois district became increasingly less acceptable to the mills in 1953. Several steel manufacturers raised chemical requirements of effective CaF₂ in their fluxing gravels and nearly all demanded that less flotation concentrates be shipped in the gravels.

There was considerable activity in western mines, many of which were shielded from the effect of the imports which cannot reach far western markets. Ozark-Mahoning had started its large mill at North Gate, Colo., in 1952. All output there is under contract to the Government for three years. Another mill at Meyers Cove, Idaho, was built with Federal help, but burned down during the summer. It will not be rebuilt. The ore from the mine belonging to U. S. Steel Corp. near Darby, Mont., is being shipped to Geneva Steel in Utah. Kaiser's flotation plant at Fallon, Nev., was put into operation during the year, producing acid grade fluorspar which is shipped to the General Chemical Co. at San Francisco for conversion to aluminum fluoride. The ore comes from the old Baxter mine 73 miles southeast. A new lens of ore was discovered during the year. General Chemical continued to operate its mills at Jamestown, Colo., and Deming, N. M., but the Zuni mill at Belem, N. M., shut down.

There was activity around Duncan, in eastern Arizona. The Arizona Eastern Fluorspar Corp. consolidated three small companies, one operating a mine called the Lone Star, 15 miles SW of Benson in western Cochise County, and two others, the Sydney and Polly

Anna, north of Duncan. A 75-ton mill was under construction at Duncan to treat ores from these mines. Ore from the Lone Star had been going to the Zuni mill. Shaft sinking under a DMEA contract was under way at the Polly Anna.

The Homestake Mining Co. of Yuma, Ariz., converted the old Holmes mill at Winterhaven, Calif. (across the river from Yuma), to treat ore and tailings from the old Castle Dome mine. Lead and fluorspar concentrates were being made.

The capacity of the Lucky and Greenleaf mines, north of Deming, was being increased, for sale of spar to the mill in Deming. Another new supplier for General's mill is a mine at Fort Thomas, Ariz., Graham County, south of Coolidge dam. A big deposit in the wilds of Salmon River Canyon in Lemhi County, Idaho, has been known for some time, but has been considered inaccessible. A company called Fluoride Mines of Wallace, Idaho, has been formed to hold the claims.

Imported Spar in East

The Eastern market was dominated by imports from Spain, Italy, Germany and from Newfoundland. Imports from these sources have not been able to reach into the Pittsburgh market, and are kept out of the Gulf Coast since there is little market there for metallurgical grade, and there is no drying plant to receive acid grade filter cake. On the East Coast, there are the two big steel plants at Baltimore and Morristown, with a number of small ones in the eastern Pennsylvania area, all using metallurgical spar. The du Pont plant at Deep Water Point, N. J., consumes about 30,000 tons per year of acid grade spar. In addition, there are several consumers of ceramic grade in the area, but since there are two drying plants in Wilmington to handle filter cake, suitable for either acid or ceramic grades, there is a scramble on the part of the overseas producers to sell in that market, and there has been some shading of price.

The St. Lawrence Corp. of Newfoundland operates mines at St. Lawrence on the Burin Peninsula. It has been expanding its mining operations to feed the big mill above mentioned, under construction with Government funds at the Marine Terminal at Wilmington. The management of St. Lawrence hopes to supplement its own production with purchases of crude from Europe, and during this period of over-production this may be possible. The mill has an 8 by 8-ft ball mill and large flotation cells, and hence must be run at nearly its rated capacity of 300 tpd of feed. At year's end there was no accumulated stock of crude at the mill, although the mill was about finished.

The St. Lawrence Corp. signed a new wage agreement with its local union at St. Lawrence calling for an increase in hourly rates of 12 cents per hr, with an eight-hr day, six days per week, with time and a half for overtime and on five specified holidays.

The other Newfoundland producer, a subsidiary of Aluminum Co. of Canada, expects to double its output in the next two or three years to supply Alcan's new smelter at Kitimat, B. C. It has been prospecting for more ore at the head of the Burin Peninsula.

The Mexican producers, who are credited with causing most of the disturbance in the U.S. market with the flood of new production, have also had their own difficulties. The ore bearing areas in Coahuila have been greatly extended, and now are subdivided as follows: Bouquillas and San Vicente, Encantada and Buena Vista, El Tule, San Manuel and La Mariposa, and La Paila. Two mills have been built, one at Muzquiz by Senor Adolfo Romo. This mill has both heavy media units and flotation, and is probably doing a unique performance in making acid grade spar in the heavy media plant. The other mill at Agujita, near Nueva Rosita, built by the American Smelting and Refining Co., is an all-flotation plant. It was started in July, 1953, and was shipping high grade concentrates to Houston and Hurricane Creek, Ark.

The exploration now done in the areas has shown that the reserves are probably very large, but the remoteness of the areas and the lack of good roads make shipping costs very high. A serious handicap is that the nearest rail heads are distant from ports from which water transportation by barge through the intercoastal waterway to the Mississippi, or by ship to other ports could be made. The railroads have not seen fit to establish a commodity rate from Eagle Pass to Corpus Christi, and the present \$7 per ton class rate is prohibitive. Shipment via Mexican rail could be made to Brownsville or Tampico, at which port new dock facilities have just been built, but the shortage of Mexican cars is proverbial. Hence, Mexican spar can reach only to the limit of the competitive freight rate from the Illinois-Kentucky district, and this means essentially the fluorspar markets of Houston, Baton Rouge and Huricane Creek. If Mexican fluorspar could be put into barges at Brownsville or Corpus Christi at low freights from the Mexican shipping points, the Illinois-Kentucky producers could be really worried. Until then, they have the Middle West market well insulated.

An important deposit of high grade fluorspar has been found in Zululand, in a native trust area, 150 miles from Durban (Mineral Trade Notes, September, p. 57-8).

GEMS-Statistics on diamond sales through the Central Selling Organization showed that 1952 established a record in total sales of £69,661,000, compared with sales in 1951 of £65,-057,000, but the big increase was in industrial sales. In the first half of 1953 the gross sales were £31,450,182 and gem sales were about holding their own, but industrial sales for the half were down to £8,151,000, which compares closely with 1951 industrial sales of £9,111,000. Actually the value of gem sales for the first quarter of 1953 was believed to be a record in the industry.

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Early in June, the report of the annual meeting of the DeBeers Consolidated Mines was published. At this meeting Sir Ernest Oppenheimer declared that the boom times in the diamond industry had come to an end. The drop in sales of industrial diamonds was attributed largely to virtual cessation of purchases by the U. S. Government for stockpiling, and also to dumping of diamonds for drill bits at low prices by an African Chief in the Gold Coast.

In Southwest Africa, output by the Consolidated Diamond Mines of South West Africa, Ltd., increased in 1952 over 1951, whereas the production of Industrial Diamonds of South Africa produced only 20,672 carats in 1952, compared to 48,356 in 1951. French Equatorial Africa expects to double its production of diamonds within four years. Production of diamonds from Venezuela has been much in the news. Diamond deposits are found in Bolivar State, in the regions of the upper and lower Caroni, the Paragua river and at Icabaru. The Venezuelan Diamond Co. has invested over \$1,000,000 in equipment, and in 1952 produced over 99,000 carats. However, the production in the first six months of 1953 was 10,000 carats below the corresponding period of 1952.

A great improvement in diamond drill bits has been made by setting bits with stones oriented in hard vector directions. Tests have indicated a spectacular reduction in the cost of the bit per foot of rock drilled.

A new locality where gem quality emeralds have been found in India was reported in the *Delhi Express* for January 16, 1953. The best quality stones sell for about 18 rupees per carat (about \$3.78).

Accurate statistics on the production of gems in Ceylon have never been available. The production for 1952, mostly of varieties of corundum, was estimated at 1,500,000 to 2,000,000 rupees, and of other stones, alexandrites, cat's-eye, aquamarine, topaz, spinel and zircon was a like amount.

In 1953, a shipment weighing 187 lb of jade from the new Alaskan locality in the Kobuk River area north of the Arctic Circle was reported by the Alaska Native Industries Cooperative Association in Seattle.

An interesting description of the famous Australian opal deposits was given in the Canadian Mining Journal for July, 1953.

GRAPHITE—It is reported that the famous old graphite mine in Ontario called the Black Donald is about exhausted and will shut down shortly. A new property in Bedford Township, 25 miles north of Kingston, will be developed (Can. Min. Nat. Bull., Sept., p. 549).

GYPSUM—Because of the activity in the building industries, the demand for gypsum products in 1953 approached if not exceeded the record year of 1951. Roof bolting as practiced in coal mines has been adopted successfully in a number of gypsum mines. A new deposit of gypsum was discovered in Southern Indiana and a number of companies are reported to be planning development there. Northwest Gypsum is starting operation of its property at Weiser, Idaho. Another new mine is in west Texas and is being developed by the Casner Chemical Co. of El Paso.

Several new plants were building or announced in 1953. Kaiser Gypsum announces a plant in Seattle to cost \$4,000,000 to produce 10,000,000 sq ft of gypsum board products. The rock will come from San Marcos Island in the Gulf of California. The chairman of the board of National Gypsum announced plans to spend \$18,000,000 in the next two years for plant expansion. A 30 percent increase in capacity at Savannah and a million-dollar Research Center in Tonawanda, N. Y., were specifically mentioned.

Several new gypsum board products were announced. U. S. Gypsum has brought out "handyman" sheets for amateur mechanics and a product called "Structo-Lite" which is a ready mixed perlite-gypsum plaster. Certain-teed Products Corp. has announced a gypsum wall board with reinforcing strands of fiber glass, giving a much greater resistance to shock.

An economical method of applying gypsum to the soil to counteract alkalinity resulting from excess irrigation was to put ground gypsum in the irrigation water. This has been recommended by the University of Arizona School of Agriculture.

An expansion of plants in Canada has been announced by Canadian Gypsum Co. of Toronto. A new plant will be built at Montreal, and the capacity of the plant at Guelph will be increased 40 percent.

The California Division of Mines published its Bulletin 163 on Gypsum in California, and Bull. 989-B of the U. S. Geological Survey describes deposits on Chicagof Island, Alaska. Operation of the mine of the U. S. Gypsum Co. at Heath, Mont., was described (Trans. AIME, February, 1953, p. 177).

KYANITE-In 1952 India exported

24,104 long tons of kyanite, but only 2154 long tons were shipped to the United States. A big deposit was discovered in Austria early in 1953 in the Whipp Valley in the Tyrol. It is being developed by Wipptal Bergwerks Gesellschaft.

The U. S. Geological Survey issued geological maps covering kyanite deposits in Prince Edward and Charlotte Counties, Va.; in Buckingham County, Va.; Henry Knob, York County, S. C., and the Reese Mountain Club area of Lincoln and Gaston Counties, N. C.

LIGHTWEIGHT AGGREGATES A major development, centering in the Plains States, is the manufacture of expanded shale which is marketed under such names as Haydite and Denilite. The group of manufacturers has its own trade organization called "The Expanded Shale Institute" which is financing a research program at the University of Toledo. Much of this lightweight product is made from clay or shale, although slag is also used. The following news items are typical: Rescolite Co. has started production of expanded shale aggregate at Fort Smith, Ark.; United Cement Products Co. of Wichita, Kan., is building a sintering plant at Darby, Kan., for the production of Haydite; Moss Lightweight Aggregate Co. has started operation of its new plant at Memphis, Tenn.; Oklahoma Lightweight Aggregate Co. is building a \$250,000 plant at Choctaw, Okla., to make Haydite. Another plant is being established at Mobridge, S. D., by a group that built a plant at Rapid City last year. Molite, Inc., is building a plant at Mandan, N. D., to make aggregate from shale. However, this development is not confined to the Middle West, since in Virginia the Carolina Solite Corp. is building a million-dollar plant at Aquavale to make lightweight aggregate.

Even in Alaska, Basic Buildings Products, Inc., is building a \$250,000 plant at Anchorage to make a product from shale to be called "Baselite."

LIME—The National Lime Association announced the results of its 24th annual survey of agricultural liming materials covering 1952. Nearly 95 percent of lime sold for agricultural purposes is unburned, of which about two thirds is used in the north Central States. Iowa passed Illinois as the biggest user. Illinois had had that distinction for 17 years. Building and chemical industries consume the bulk of manufactured lime products.

LITHIUM—New construction and increased mining activity dominated the news in the lithium field during the past year.

During the summer Foote Mineral Co. substantially completed construction at Sunbright, Va., of the largest lithium chemical refining plant in the world. This plant is now operating, although not yet at its designed capacity. It is anticipated that it will reach this during the first half of 1954. Lithium Corp. improved its chemical refining plant near Minneapolis

during 1953.

The Foote Mineral Co. more than doubled the production of its spodumene mine and mill at Kings Mountain, N. C., during 1953. Other domestic production of lithium ores did not substantially increase, but the enlarged Kings Mountain output apparently contributed to the largest U. S. production of lithium ore concentrates in the history of the U. S. A.

Foreign lithium ore production was also the largest in history. Portuguese Mozambique became an important supplier of lepidolite. In Southern Rhodesia production of lepidolite, petalite, and amblygonite was expanded and resulted in the export of some thousands of tons, particularly

in the last half of 1953.

Late in 1953 Selection Trust announced that they had acquired one of the two largest deposits in Southern Rhodesia and that two American com-

making a \$400,000 expansion there. The Bob Martin brucite mine, three miles northwest of Oatman, Ariz., has been leased to the U. S. Brucite Corp. of Gabbs, Nev.

Since 1952, the brine or sea waterdolomite processors have had a static production level, although two plants doubled capacity in years just pre-vious to 1953. By midyear, the industry had a surplus stock. The rated combined annual capacity of all magnesite-producing plants in the United States exceeds 500,000 short tons in terms of deadburned grains, ranging in purity from 82 percent MgO to 96 percent MgO. Domestic supply is sufficient, at least for so-called normal demand by steel, metallurgical and miscellaneous refractory trades as furnished in the forms of grain, mortars, ramming mixes and brick. Noteworthy is the high present capacity by plants producing magnesite from sea water or other brine. For the first time, the combined capacity of these plants equals the capacity of the more operate magnesite mines in the State of Ceara.

MICA—Imports of muscovite block, film, and splittings, domestic production of muscovite block mica, and sales of ground mica, increased in 1953 above 1952 figures. The demand for high qualities of muscovite film and block for electronic uses remained at a high level during the year.

Sheet mica is still on the critical list and the General Services Administration maintains purchasing depots at Frankln, N. H.; Spruce Pine, N. C., and at Custer, S. D. A boost to the production occurred when purchases of green mica in addition to the ruby

variety were authorized.

Buying at Spruce Pine began in July, 1952, and by January, 1953, was at a rate of \$2,000,000 a year. The decision to buy green mica as well as ruby is expected to increase the pur-

chases 100 percent.

Prices for the green vary from \$1.60 per lb for the smallest size block in the "heavy stained" grade to \$56 per lb for the best grade blocks, 10 in. or over. Ruby prices are 20 percent higher. Purchases of the green were delayed until the depot obtained deliveries of so-called "Q" meters to test the quality of the sheets.

Defense Minerals Exploration Administration, on November 3, 1953, announced a reduction from 90 to 75 percent in government participation in approved exploration projects for muscovite block and film mica.

Under the stimulus of the government purchases, some old mines in Pickens County, Ga., have reopened.

Another reopened old source of sheet mica is in Latah County, northern Idaho, where an old mine worked first in 1888 has been reopened by the Idaho Beryllium and Mica Corp. Beryl is recovered as a by-product. The company has a DMEA contract for \$28,700.

In South Dakota the General Services Administration has set up a program to rent mining machinery to small operators.

Scrap or ground mica is produced in many parts of the country. A typical operation at Kings Mountain, N. C., was described during the year (E&MJ, March, 1953, pp. 95-7).

It was reported that dry-grinding plants are producing between 45,000-50,000 tons a year of ground mica. Selling prices range from \$30 up to a top of \$57 per ton.

A study of deposits in the southeastern states was issued during the year: U. S. Geological Survey, Professional Papers, A to G.

India still is the most important source of high grade mica. Exports both in value and quantity were maintained through 1952, but a decline began in 1953, and export is now predominantly of higher grades. Approximately 52,000 people are em-

(Continued on page 77)



There was considerable activity in western fluorspar mining

panies would participate with them in this lithium mining venture. One is the American Metal Co. and the other is American Potash and Chemical

Southwest Africa continued to be an important exporter of lepidolite, petalite, and amblygonite. Most of the lepidolite and petalite from Africa was shipped to the U. S. A., and most of the amblygonite was shipped to Western Germany during 1953.

During the year the demand for lithium chemicals and processed lithium minerals exceeded the available supply. It is anticipated that supply and requirements will be approximately in balance during 1954.

MAGNESITE INDUSTRY—New Mexico's first producer of Magnesite products entered the field during the second quarter. Nevada has two operators of natural magnesite and brucite in the now well-known Gabbs Valley district. Basic Refractories is

remotely located plants operating on natural carbonate deposits. Competition is responsible for the development of special products with enhanced physical properties, obtained by adding additives, during calcining, in amounts safely within the proper eutectic limits.

In this field of special products, the sea water or brine-dolomite processes lead because of the extremely high purity of the magnesium oxide made. The demand for light burned (calcined) products for the insulation, chemical, building and super-fertilizer trades continues strong.

Abroad, Austria has recovered as an important producer of crude and burned magnesite. Production in 1952 was 742,292 metric tons of crude MgCO₃—as compared with 397,383 in 1937.

In Brazil, Harbison Walker Co. has received government authorization to

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Now, you can take full advantage of the large hole drilling technique with a rotary drill too—the Bucyrus-Erie 50-R. Here's a machine, designed to drill 97/8 to 121/4-in. holes, which has proved its ability to drill these large diameter holes in the shortest time possible.

For example, a 50-R, operating on 63/4 hour shifts in a large Indiana open pit coal mine, drilled 2,598 holes of 105/8-in. diameter to an average depth of 42 ft. in six months. The average drilling rate was 125.1 feet per hour for a total of 844.4 feet per shift. Overburden consisted of medium hard sandstone with an overlay of hard shale.

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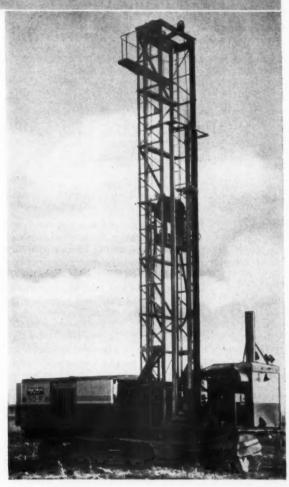
7 Down pressure on the bit is hydraulically powered for maximum controlled penetration.

2 Ward Leonard electric control on rotation of drill pipe permits drilling at most efficient speed for a given formation.

3 Drills continuously for 32'-8" before an additional drill pipe section is added.

4 Drill pipe sections are added or removed in a few minutes with a remote-controlled, power-driven tool handling unit. No heavy manual labor is involved.

5 Cuttings are removed from the hole as drilling progresses by two 640-cfm air compressors. Only the "fines" are picked up and handled by the Roto-Clone precipitator. "Heavies" pile up adjacent to the drill hole for use as stemming material.



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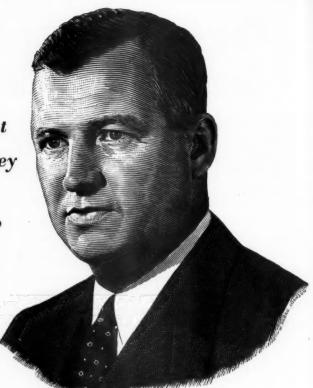


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Here are a few facts and figures:

- For every dollar of public debt held by a commercial bank, about five new dollars may be created in the form of credit. Obviously, the larger the amount of the public debt held by individuals, the greater the check on inflationary tendencies.
- At the end of 1953, the cash value of Series E and H Bonds *held* by individuals was more than 36 billion dollars. This total is growing steadily, thanks largely to the month after month purchases of Series E Bonds by more than 3,000,000 Payroll Savers.
- Sales of E and H Bonds in 1953—23% higher than in 1952—provided cash for all E and H Bond maturities and

redemptions and still left over \$210,000,000 net for the reduction of bank-held debt.

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MINING CONGRESS JOURNAL



Industrial Minerals

(Continued from page 74)

ployed in the Indian mica industry.

The use of Humphreys spirals for the recovery of fine-grained mica and the substitution of centrifuges for filter presses to remove water from ground mica increased during the year.

Products produced from synthetic mica developed by the U.S. Bureau of Mines at its Electrotechnical Laboratory, Norris, Tenn., were investigated by industry. Synthetic mica was recognized not only as a substitute for natural mica in many applications, but also as a new ceramic raw material with properties and uses not possessed by natural mica and was tested for glass-bonded mica ceramics, phosphate-bonded and hot-pressed ceramic dielectrics, a bonding agent in abrasive wheels, a component in specialty paper products, and for various other products.

MINERAL WOOL—American Rock Wool Corp., Wabash, Ind., has purchased the stock and plant of Feltrock Insulation Co. at Tacoma, Wash. With this addition the company now has seven plants in the United States.

MONAZITE-Production and continued exploration of monazite in the Cascade area of South Central Idaho was accelerated during the year. Baumhoff-Marshall and Idaho Canadian Co, were pioneers in the area, but they were joined this year by Gem Monazite Mines, Inc., which claims to have blocked 10,000,000 cu yd of material that can be dredged in Valley County and has built a separation unit on a barge to be towed astern of the dredge. Another company is Idaho Titanium Co., which has built a plant at Weiser on the Snake River to separate magnetically heavy mineral concentrates produced by the K & D Dredging Co. at Ruby Meadows in Idaho County. DMEA granted an exploration loan to V. W. Vandeventer for exploration on Big Creek, which is in north central Valley County. The extent of the placer ground in Boise, Valley and Idaho Counties indicates that this will be one of the major monazite producing areas of the world. This reviewer found the mineral in the Lochsa River for 25 miles. This is in northeast Idaho County.

The development of a rock deposit of monazite in South Africa was announced in these columns last year. It is now reported that large scale production is planned by the Monazite and Mineral Ventures, Ltd., at its Steenkampskraal mine in Cape Province. In Brazil, Sulba Sociedade Comercial de Minerios, Ltd., a subsidiary of Orquima Industries, is erecting a plant at Barra do Itabapoana, in the northeast corner of Estado de Rio de Janeiro, for the production of monazite.

Minerals Refining Co., with labora-

tories in the former A. S. & R. smelter at Murray, Utah, has been licensed by the Atomic Energy Commission to deal in the reduction of uranium and thorium, and is also separating monazite and other rare earths.

PERLITE AND PUMICE—Further development in the perlite industry took place, particularly in the West, but one plant was built in Jackson-ville, Fla., which, however, will receive its raw material from New Mexico.

The Pumice Corp. of America, which had large holdings of perlite in the area around Grants, N. M., has been sold to the U.S. Gypsum Co., which has also bought other properties in the area, including the Silver Perl mine. Great Lakes Carbon Corp. claims it is the largest producer of perlite. It has acquired all perlite properties of the Alexite Engineering Division of Alexander Film Co. transaction included a mine at Rosita. Calif., and a processing plant at Florence, Colo. Western Mineral Products Co. of Minneapolis has purchased the perlite processing equipment of the Johnston Manufacturing Co. of the same city. Perlite Industries of Midland, Texas, started operation of a new perlite processing plant at Terminal, Texas. The operation of the plant at Panaca, Nev., by the Texas Panacalite Co. was described in the Mines Magazine for January, 1953. The perlite industry held its annual meeting at Minneapolis, October 1-3, at which new developments were described. A long report by the Robert W. Hunt Co. makes available comprehensive data on perlite concrete for roof slabs and columns.

REFRACTORIES—For high temperature use, synthetic fused mullite refractories are finding increased use. Increasing interest has developed in refractory concrete or refractory castables. Development of materials which can withstand temperatures up to 3000 degrees F has greatly expanded their use.

The refractory castable is an iron free calcium aluminate cement. This cement was first brought out by Babcock and Wilcox under the name of Kaocast, but the Aluminum Co. of America is now also marketing it under its chemical name. A score of aggregates can be used in making refractory concrete with this cement, including fire brick grog, chrome ore, dead burned magnesite, alumina bubbles made by the Carborundum Co., zircon, etc. When exposed to high heat, the concrete gives off its water by hydration and the cement recrystallizes into a ceramic bond.

Nonmetallic heating elements of silicon carbide were placed on the market in 1953. They are nicknamed "hot rods" and are used in kilns heat treating, melting and sintering furnaces where operating temperatures run up to 2750 degrees F, which is above the temperature range of metal-

lic heating elements. Another use for silicon carbide is as an electrical resistor. Being non-ohmic it lends itself to uses where control of resistivity is the principal factor.

Canadian Refractories, Ltd., furnished a large basic refractory brick plant at Marelan, Quebec. International Minerals and Chemical Corp. has constructed a new refractories plant at Janesville, Wis.

A most important source of refractory grade chromite is from Masinloc, in western Luzon, Philippine Islands. A new heavy media separator is being installed which will about double the output of about 45,000 tons per month.

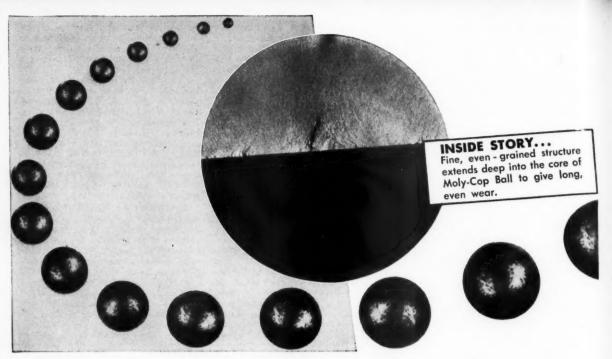
ROOFING GRANULES—Minnesota Mining and Manufacturing Co. has announced plans for a \$1,500,000 expansion of its granule manufacturing facilities at Wausau, Wis. The company operates quarries and granule plants at Little Rock, Ark., and Corona, Calif. A fourth plant in Somerset County, N. J., is contemplated.

SALT—The International Salt Co. has purchased all rights to mine salt beneath the Wayne County (Mich.) airport. Since the salt bed is 1000 ft below the surface, mining will not interfere with airport operations. Canadian Salt Co., Ltd., is developing a new property near Windsor, Ont. Work is under way on a multicompartment shaft 16 ft in diameter. Rock salt mining in dry form is new to that part of Canada, most of the salt coming from brines. The only other rock salt mine in Canada is at Malagash, Nova Scotia,

SILICA—Silica is produced in most places as a sand, but instead of being used as a fine aggregate it is produced for its actual chemical composition in refractories, chemicals and glass.

Harbison-Walker opened a model plant at Windham, Ohio, which produces silica brick. The raw material is the Sharon Conglomerate, quarried six miles from the plant. The company finished a similar plant at Fairfield, Ala., a year ago. Browntown Silica Co. of Hanover, Wis., has finished an expansion program. Pacific Silica Co. produced a record 140,000 tons in 1952 from its Denison (Wash.) quarry. Another Washington producer that expanded is the Springdale Silica Sand Co. of Springdale, Wash. Another silica sand expansion in the Northwest was at Bergdorff, Idaho County, Idaho, where the Jean-ette Creek Mining and Exploration Co. started operation.

SLAG—Blast furnace or open hearth slag has been used for years as concrete aggregate, and for ballast for railroads, and for roads where crushed rock is not available (as in Florida). A new plant to use slag from the Garfield copper smelter of the American Smelting and Refining Co. has been built at Garfield essentially as a processing plant for ballast, but also to produce fine aggregate as well. The



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operation of one of the largest of such plants in the U. S. at Dearborn, Mich., was described (Rock Products, October, 1953). This plant has a capacity of 1000 tph, and purchases slag from the Great Lakes Steel Corp. in Ecorse, Mich., and from the Ford Motor Co.'s River Rouge plant. An interesting feature of the plant is the recovery of a large amount of iron before the slag goes to the primary crushers. About 80,000 tons of iron are recovered each year and returned to the steel mills.

The production of expanded slag is a new development and it is finding use as a lightweight aggregate and also has a fire resisting insulating material, to be used especially in the cores of standard hollow masonry units. The Gary Slag Corp. of Chicago began operation at Gary of a new plant on the property of the U.S. Steel Corp. to produce an expanded lightweight aggregate called "Garylight." Another plant under construction by the same firm is at Duluth, Minn., on property of the American Steel and Wire Div. Approximately 100,000 cu yd of expanded slag will be produced annually by the Kinney-Osborne process.

SLATE INDUSTRY—Operations during 1953 continued the downward trend of 1952 in all phases of the industry. Roofing slate is particularly hard hit due to curtailment of institutional and church building because of high costs and other uncertainties. Current inventories are relatively high; some operations are shut down and others working on a curtailed basis. Slate flagstone production has held up better than other slate products but is behind previous years' totals in both value and quantity.

The production of slate granules has run behind previous years due to lowered construction rate and inroads of competitive materials.

Considerable research and development is being carried on toward diversification of the industry and utilization of waste materials.

The industry is asking for 15 percent depletion allowance in the 1954 tax bill on the basis of equality with competitive materials.

TALC-Mine production of talc, pyrophyllite and ground soapstone decreased six percent in quantity in 1952 from the record high production of 1951. The 1953 production is expected to have equaled that of 1952. New York ranks first in production and produces about 1/3 of all talc produced in the country. California is second and North Carolina third. The bulk of the pyrophyllite is produced in North Carolina. The total value of sales in 1952 was \$11,347,317. Six industries, ceramics, paint, insecticides, rubber, roofing and paper consume 83 percent of the domestic production.

In New York State seven mines are in current production in St. Lawrence County. The most significant develop-

ment in New York was the acquisition of Loomis Talc Co. by International Talc Co. There are now only two producing companies in St. Lawrence County, International and Gouverneur Talc Co. Carbola Chemical Co. operates a talc mine in Lewis County.

In California, Sierra Talc & Clay Co., the major producer, has completely rebuilt its Los Angeles grinding plant. In addition to this, another mill has been installed for increased production of ultra-fine particle size tales.

Talcs of this extreme fineness are finding increasing use in paints, especially in alkyd and latex base flat wall paints. They are also used in various types of plastic compositions. These products possess as much as five times the specific surface of conventional 200-mesh talcs. For this reason they show greater reactivity in certain types of ceramic bodies.

Production of 200- and 325-mesh



Some of our vermiculite came from South African deposits

talcs continues at high levels. These products are used principally in floor and wall tile, pottery and other low temperature ceramics, steatite insulators for radio and television, cordierite ceramics for high resistance to heat shock, house paints, textile filling, paper, rubber dusting, cosmetics and insecticide carriers. A number of grades, especially developed for each end use, are being sold.

Mining activities center around Owens, Saline, Eureka and Death Valleys, where several producers have extensive holdings and developments. Ore reserves have been proved ample for many years to come.

North Carolina runs closely behind California in tonnage produced, but the value is much lower. For 1952 the value of North Carolina talc was only \$15.30 per ton, as compared with \$23.80 for the California product, a much larger proportion of which is finer ground.

Sierra Talc and Clay Co. of California established a talc processing plant at Grand Island, Neb., to handle talc mined in Montana. Southern

California Minerals Co. announced the discovery and started mining operations of steatite grade talc near Dillon, Mont. This is a new source of talc suitable for ceramic use.

Japan is the second largest producer of tale in the world. In 1952, the U. S. produced 545,132 metric tons, Japan 318,386 tons, and France was a poor third with 95,400 tons.

TANTALITE AND COLUMBITE— These minerals have generally been considered to belong to the industrial mineral family, but actually they are used principally as ores of the metals, a big demand for which is developing in these days of jet engines and atomic energy.

The minerals are still on the critical list, and are purchased at the General Services Administration depots at Franklin, N. H.; Custer, S. D., and Spruce Pine, N. C. Fansteel Metallurgical Co. of Chicago, Wah Chang Corp. of New York, and Kennametal Inc., of Latrobe, Pa., are also purchasing agents.

Probably the biggest domestic news in this field is the discovery of important deposits in Bear Valley, Valley County, Idaho. Bear Valley is in the southeastern corner of the county, and is a tributary of the Middle Fork of the Salmon River. It heads in Township 11 N R 8 E and extends north to T 13 N, R 9 E. Although in the same general country as the monazite placers 25 miles further west, these gravels in Bear Valley carry only a little monazite while those around Cascade carry no columbite. Except for this locality, the production of these minerals in the U. S. is only a by-product of feldspar and mica mining. There has been some effort made in the laboratory to recover niobium from the brookite and rutile at Magnet Cove, Ark., and a number of rutile samples have been found to carry niobium, but apparently the amount in rutile is erratic. The U. S. Geological Survey has developed a method of analyzing for niobium, a description of which will be published in the near future. It is said to be adaptable to ores with any quantity of the metal, which is a limitation to the old spectographic method.

Other news items on these minerals are all from foreign sources. Nigeria produced 214 tons of columbite in 1952, and because of a price raise expects the production to be higher. In South Norway, a government controlled mining company, Norsk Bergverk, A/S, is mining columbium in the Sove district near Ulefoss. In Western Australia, the Blue Spec Mining Co. of Nullargine is producing both minerals. Its Wodinga mine in the Pilbara field is described by Dr. H. G. Raggatt of the Australian Department of Supply as the world's major producer of tantalite. In Southwest Africa the Uis Time Mining Co. is installing equipment to separate columbite from its cassiterite concentrates. These are produced from pegmatites, and two pegmatite bodies have been found that contain tantalitecolumbite as the main ore mineral. Belgian Congo, Brazil, Uganda and Nyasaland are also producers of small amounts of the minerals.

Besides columbite-tantalite concentrates, the Bureau of Mines reports, large quantities of tin slags containing from 7 to 21 percent combined columbium-tantalum pentoxides are imported from Belgian Congo, Portugal, British Malaya, and the United Kingdom (Nigeria). Fewer than three companies import these slags, and quantitative data are not available for publication.

TITANIUM ORES-The latest figures from the U.S. Bureau of Mines available on production and imports of titanium ores are shown below.

The growing wide interest in titanium metal and the numerous articles on that subject published in the papers has caused a great deal of activity in the search for titanium ores and their evaluation.

The outstanding developments for the year were as follows:

The McIntyre Mine of the National Lead Co. at Tahawus, N. Y., continued to be the world's largest producer, and since the sales contract with du Pont under which one-quarter of the production was sold to that company had expired in 1952, all of the production was absorbed by the National Lead Co. The Quebec Iron and Titanium Co., operating an open pit mine at Allard Lake, Quebec, and a smelter at Sorel, Quebec, to produce pig iron and a slag rich in titanium, was very active during the year. The five electric furnaces were put into operation and large shipments of slag were made to pigment manufacturers in the United States.

The manager of Q. I. & T., F. E. Walling, made the following statement in regard to his operation:

"During the year 1953, the Havre St. Pierre Lac Tio operation of Quebec Iron and Titanium Corp. mined, crushed and shipped 102,000 gross tons of ore containing more than 88 percent of combined titanium and iron oxides. Five electric arc reduction treatment furnaces were operated at Sorel at various power input capacities. Approximately 130,000 gross tons of slag containing 70 percent equivalent TiO2 were shipped during the season, the greater part of the slag being exported to U.S. for titanium pigment production. Small lots of the slag were shipped to various chemical industries, for experimental work on chlorination. Constant research was carried on throughout the year on every phase of the operation at Sorel."

This slag has proved to be a very satisfactory raw material for the manufacture of pigments by the sulfuric acid process.

The du Pont Co. has started construction of a second sand plant on Trail Ridge in Florida. This will be called the Highland plant, and when in operation, early in 1955, will produce 100,000 tons of titanium minerals by dredging of the crude sands and concentrating them in spirals and by electrostatic methods as at its operating plant near Starke, Fla.

There were two discoveries of new deposits which may prove to be important-one in Gambia, in West Africa, by geologists of the British Titan Products Co., and the other in Hawaii by agricultural students of the University of Hawaii who were studying soil deficiencies of certain poor agricultural areas in the island of Kauai. A particular soil proved to be exceptionally high in TiO2. Whether the titanium oxide in these soils can be recovered is not yet known, since all of the earth is finer than 325 mesh, so that ore dressing methods now used on other ores are hardly applicable. Little information has been released in regard to the Gambia deposit, but it is known to be an elevated beach ridge, a few miles back from the coast and to contain at least two million tons of crude sand. Neither the grade of the crude sand, nor the quality of the ilmenite has been announced, nor have the plans for production.

Nearly every other owner of a titanium deposit has been considering possible plans for development, or is actually in development.

The Union Pacific Railway Co. has been drilling its deposit of titaniferous magnetite north of Laramie, Wyo., and is said to be doing considerable metallurgical testing on the ore. Frank Eichelberger of Seattle and associates have been making extensive tests on the perovskite ore at Iron Hill in Gunnison County, Colo.

The Titanium Development Corp. of Montreal has drilled the deposit near Ivry, Quebec, and has proved the existence of a much larger reserve than was formerly known,

The Titanium Corp. of Florida, operating near Sebastian Inlet, south of Melbourne, Fla., has installed a pilot plant to concentrate the heavy minerals.

A deposit in Natal, at Illovo Beach on the East Coast of South Africa, has been under development for a couple of years by the Titanium Corp. of Umgababa, Natal.

The deposit is said to contain 25,-000,000 tons of crude sand, about 11 percent ilmenite, with a small amount of zircon and rutile.

A spiral plant is being built. Presumably an electrostatic and magnetic plant will follow. The ilmenite is said to analyze about 50 percent TiO2.

Egypt has been making plans to develop a deposit on the Red Sea.

TITANIUM FIGURES-METRIC TONS

ILMENITE	Production 1952	Imports to U. S. 1952
Canada India	(1)	34,923 (4) 132,208
Malaya Norway		
Portugal Senegal	75	
Spain	1,110	
Total	893,000 (*)	167,131

* Shipments 474,582 containing 241,231 tons TiO2 = 50.83 percent TiO2 grade.

RUTILE

Australia	17,575
French Cameroun	
Norway 43	
Brazil	
India	
United States(2)	
Total	17 575

- (4) Figures for India, Brazil and Australia are estimated and included in final totals.
 (2) Not disclosed.
 (3) Estimated by U. S. Bureau of Mines.
- (4) Mostly slag

ILMENITE PRODUCTION-1953 METRIC TONS

	Estimated	
United States Shipments		428,701

*Containing 215,258 tons of TiO₂ = 50.21 percent TiO₂ grade.

Ilmenite Imports—9 months—190,071, of which Indian shipments were slightly lower and Canadian were up 200%, as compared with 1952.

Imports of Rutile—1953—not yet reported.

Various promoters have tried to interest capital in developing the deposits at Pulmoddai on the East Coast of Ceylon, north of Trincomolee. This deposit consists of a black beach similar in appearance to the Travancore Beach, but the ilmenite assays only 53 percent TiO₂, and hence is worth much less to a pigment manufacturer than the much higher grade material from Travancore. The deposit does contain several percent of rutile, and is probably one of the largest reserves of that mineral known.

Malaya has developed a substantial export business in ilmenite analyzing 50 percent TiO₂ produced as a byproduct of tin concentrate. In 1952, 22,498 long tons of ilmenite were exported, of which 7210 tons went to France, 5194 to England, and 3995 to Germany.

There has been some attempt also to promote exploration of the rutile deposits in New Caledonia and in the Cameroons.

Two new pigment plants were announced in the United States. American Cyanamid Co. is building a plant of about 70 tons of daily pigment capacity at Savannah, Ga. The New Jersey Zinc Co. has received a certificate of necessity permitting fast amortization of 45 percent of \$15,000,000 to be spent for titanium pigment facilities, but no further announcement has been made of site or date of initiating construction.

The Ishihara Chemical Co. of Japan will build a \$6,000,000 pigment plant between Osaka and Tokyo. The Glid-

den Co. of Cleveland, Ohio, will provide technical assistance and grants Ishihara licenses to use Glidden processes. The ore will come from the Malay States.

The titanium oxide plant at Trivandrum in the State of Travancore has been shut down but may be reopened, it was announced by the government.

VERMICULITE-A number of new plants have been built in 1953 to process vermiculite. The Zonolite Co. has developed beneficiation techniques so that much lower grade crude can be mined at its Libby (Mont.) opera-tion and concentrated to acceptable grade. This process increases greatly the reserves of usable crude. It will be installed also at the Enoree (S. C.) mine of the same company. The company has acquired processing plants in New Orleans, Dallas, Burnett, Texas, and High Point, N. C. The American Vermiculite Co. obtains its crude from South Africa. It has established processing plants at Spruce Pine, N. C., and Macon, Ga.

Increased use of vermiculite in chemical processing and in horticulture were the vermiculite industry's most significant developments in 1953.

Iron chelates, new compounds used to treat iron-deficient plants, were added to the list of chemicals using vermiculite as a carrier. Such chemicals normally are difficult to handle and apply. Absorbed by vermiculite, they are provided in free-flowing granular form with no adverse side reactions.

Several commercial insecticides and

herbicides use vermiculite as a carrier. Additional studies in this field are in progress. In addition, vermiculite was employed as a conditioner in about 1,500,000 tons of fertilizer in 1953.

Vermiculite extended its use in the field seeding of vegetable crops, where it is used to form a crust-free cover over germinating seedlings. Its use as a mechanical soil conditioner is accepted by amateur gardeners and commercial growers alike.

ZEPREX—This Swedish-developed building material, also called Siporex, is being introduced into the United States by the U. S. Plywood Corp. It is made in the form of a sheet, 20 in. wide, and in varying lengths, from monocalcium silicate, cement, etc. It resembles concrete in appearance, but can be sawed, drilled and nailed, and has good insulating and fire resistance qualities.

ZIRCON-The production of zirconium metal is not germane to this review. The mineral zircon is produced as a by-product of titanium sand concentrations at two plants in Florida, and in Australia. The quantity available is much ahead of market consumption. A large and growing use is as a foundry sand. Since zircon is not wetted by molten metal, the castings do not absorb a film of sand on their surfaces, and hence come out of the mold with smooth surfaces with close tolerances. Another developing use is as a fine aggregate in refractory concretes, where silica sand would cause spalling because of its volume change at 575 degrees C.

Mechanical Coal Mining Progress

(Continued from page 58)

large mine cars seems to be the most general type of recent haulage installation. Direct loading of mine cars is rapidly decreasing. Lower type sectional belt frames to meet top clearance requirements for handling men and supplies are under development.

Augers for coal recovery, essentially continuous mining machines, still enjoy wide application for recovery of coal from strip mine highwalls. They have had, however, very little application underground. Such use will probably be confined to thin and regular coal seams having extremely bad top conditions where conventional mechanical mining methods are impossible or too costly. They do hold promise for successful partial recovery of coal from seams having these conditions.

Interest in Coal Plow

Next to the remote controlled continuous miner, probably the greatest curiosity during the year was aroused by a German coal plow used on a retreating longwall face. There are reported to be three installations of this equipment presently operating. Whether it will become an important factor in coal production here is a question, although it may have an advantageous application to some mining conditions. It brings to mind the many attempts at various schemes for longwall and long face mining that were in vogue in the United States in the 1920's—none of which resulted in any wide general application.

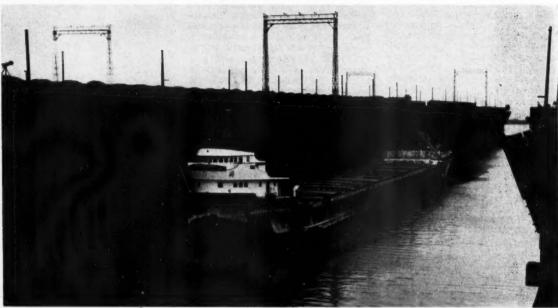
Probably the most phenomenally rapid and widespread application of a mining practice has been roof bolting. Progress has been rapid and equipment constantly improved. Present tendency is to favor rotary drilling of bolt holes where possible and to develop rotary cutting heads that can be used in harder roof strata. Self propelled mobile roof bolt drills are having wider application, and in some cases drills are being mounted on continuous miners so bolting can be carried on concurrently with mining. Bolting has resulted in the successful application of mobile mining equipment to top conditions under which the equipment could not have been successfully operated with conventional methods of roof support. However, it has become a major item of cost and the present tendency is to limit its use in short life workings where possible.

Dust suppression or collection from roof drilling, particularly for stoper type drills, continues to be a problem that has not yet been completely solved in a satisfactory manner, although a number of devices have been developed. The application of dust control to bolt drilling operations generally adds to the time and cost of the bolting and often delays the mining cycle.

There has been practically no further development of diesel powered haulage equipment for use in coal mines. This formerly held much promise for advantageous application to many situations, however, opposition to the use of diesel powered units in coal mines continues to preclude their employment to any appreciable extent.

Times are propitious for the continued development of more efficient and higher capacity mining and loading equipment. Under present and probable future wage conditions, large expenditures for equipment that will reduce the labor force are easily justified.

New Developments in Iron Ore



More iron ore than ever before was shipped from upper Lake ports

At End of Another Record Year Iron Ore Industry Pushes Research and Invests to Meet Future Demands

By R. W. WHITNEY
General Manager of Minneso: a Mines
The M. A. Hanna Co.

DEMAND for iron ore is directly related to the demand for steel. Each successive decade has seen an increase in the demand for steel to meet the needs of a growing population and a greatly expanded industrial activity. It has been estimated that in 1960 there will be 171,000,000 people and 190,000,000 in 1970. With steel capacity in the United States rated at 104,000,000 tons in 1951, it is estimated that it will increase to 125,000,-000 tons in 1960 and to 137,000,000 in 1970. To meet these needs we will need 134,000,000 tons of iron ore in 1960 and 145,000,000 in 1970. Most authorities recognize that these increased needs will be filled from two sources; namely high-grade concentrates from taconite beneficiation and imported high-grade ores. These two sources plus the remaining high grade and concentrated ores of the country will supply the needs of our steel industry in the years to come.

About 95,850,000 tons of iron ore were shipped through upper lake ports during the 1953 season. This is a new record for shipments from upper lake ports and is 20,950,000 tons more than

the 1952 total. In 1953 in the United States there were about 118,000,000 tons of iron ore shipped to the furnaces. This total is made up of the 95,850,000 tons from the Lake Superior district; 7,520,600 tons from the southern states; 8,950,000 tons from

the west and 5,600,000 tons from the northeastern states.

Three factors affect the reserves of iron ore. They are: first, the price of iron ore; second, the increased efficiency of equipment; and third, improvements in the art of ore dressing.

In the years since 1930 we have seen the Lake Erie price of ore increase from \$4.80 per ton to \$10.10 in 1953. Practically all of this increase has come since the end of World War II. Many iron ore properties or projects that were not feasible at low prices are economically sound now.

Mining methods have undergone almost revolutionary changes in the past



Taconite processing plants will soon be in full operation

two decades. Increased mechanization and new types of equipment have made possible the mining of properties that were difficult or impossible with older methods.

Beneficiation Advances

Great strides have been made in the methods of beneficiation. Early concentrating plants handled straight wash ores that were easy to treat. Today concentrating plans include not only straight wash equipment but equipment for jigging, heavy media concentration, double classification, spirals, sizers and cyclones. With the amount of effort being devoted to research, the future undoubtedly will bring many new developments in the concentration field.

In 1940 there were 25 concentrating plants in Minnesota which produced 9,000,000 tons of concentrates or 19 percent of the total shipments for that year. In 1952 there were 50 plants in operation. They produced 20,000,000 tons or 30 percent of total shipment for that year. In 1953 the number of plants grew to 56.

Growth of Ore Reserves

Since 1930 iron ore reserves in Minnesota have been increased due to the three factors mentioned above. The following statistical data were taken from the Mining Directory of Minnesota, 1953. In 1930 reserves of iron ore in the state stood at 1,235,-000,000 tons. In 1940 the reserves were calculated at 1,218,000,000 tons. During the period 1931-1940, inclusive, iron ore shipments amounted to 250,-791,000 tons. This means that there was actually an increase of 233,791,-000 tons in reserves. In 1950 reserves were shown as 980,000,000 tons while during the decade 1941-1950 shipments added up to 643,543,000 tons, so reserves were increased 305,543,000 tons in this period. The growth in reserves reported in the 20-yr period between 1930 and 1950 amounted to 639,334,000 tons, or about 0.7 ton for each ton shipped.

The direct shipping ores of the Lake Superior District, coupled with the leaner ores that can be concentrated, will not be enough to keep up with expanded demand. Therefore, the steel industry has turned to the other two sources of supply—taconites and imported ores.

Taconite Operations

Probably the most interesting and spectacular from the viewpoint of operators in the Lake Superior district are the developments in taconite concentration.

The Erie Mining Co. has been operating a pilot plant at Aurora for the past five years. The pilot plant has a capacity of 200,000 tons per year. Present plans call for a full-scale

plant that will ultimately produce up to 10,000,000 tons per year.

The Oliver Iron Mining Division of United States Steel Corp. has had an experimental nodulizing plant with a capacity of 500,000 tons per year and an experimental sintering plant with a like capacity in operation for several years. In July, 1953, the first taconite concentrates were produced from its Pilotac plant at Mountain Iron. This plant has a capacity of 500,000 tons per year. These are all experimental projects and to what degree they may be expanded will depend upon future developments.

Reserve Mining Co. presently has a preliminary plant in operation at Babbitt, Minn., with a capacity of 300,000 tons a year. At the same time, they are proceeding with an 8 to 12 section plant at Beaver Bay, Minn. A 47-mile railroad is being built between Babbitt and Beaver Bay where dock

ground to 65 mesh and then concentrated by froth flotation. The first unit, with an annual capacity of 200,000 tons, is now under construction and will be in production in the spring of 1954. The concentrates will be mixed with other ores and sintered at the Lower Lakes. Additional units expanding the operation to 600,000 tons, along with an agglomerating plant, will be added later.

At Republic, Mich., the Cleveland Cliffs Iron Co. has started a similar project at the Republic Mine. The initial operation will produce about 400,000 tons of agglomerated concentrates annually and will be in production in late 1955. This project will later be expanded to over 1,000,000 tons per year.

Initial expenditures on these projects are estimated at \$15,000,000.

While work on the nonmagnetic taconites has not been started on as



Ruth No. 3 deposit at Knob Lake will be source of first Labrador iron ore

facilities are also under construction. The capacity of the plant at Beaver Bay will be 3,750,000 tons per year. It is possible that this tonnage may be expanded to 10,000,000 tons.

All of the present and proposed plants in Minnesota are designed to treat magnetic taconite. The raw material is ground to minus 100 mesh, separated magnetically and then pelletized, sintered, or nodulized.

It would appear from present estimates that fulfillment of plans of the three projects mentioned will cost well over \$500,000,000.

Treating Michigan Jasper

There are two projects under way in Michigan for treating nonmagnetic jasper or taconite. At Humbolt, the Ford Motor Co. and Cleveland Cliffs Iron Co., in a joint venture, are opening the Humbolt Mine. The crude ore is a specular hematite and will be large a scale as the magnetic taconites, its impact may be greater because of the greater amount of nonmagnetic taconites in the Lake Superior District. Any developments in Michigan on nonmagnetic taconites will eventually be applied to solve problems in Minnesota.

Aside from new mines being opened on the known ore deposits, probably the most notable of new mines under development in the United States, outside of the Lake Superior District, is the Grace Mine of the Bethlehem Steel Co. in Pennsylvania. The property was discovered by airborne magnetometer and was the first important blind orebody to be so discovered. It will be operated as an underground mine and the product will be concentrated by magnetic separation. It is expected that the Grace Mine will come into production about 1960 and its annual capacity will be about 1,500,000 tons of concentrates.



Improved equipment and higher prices permit mining ore that formerly was by-passed

Imports Will Increase

Iron ore production from Canada will be greatly increased in the next few years both by expanding existing properties and developing new ones.

Steep Rock Mines will bring the Hogarth Mine into production in 1955 which will add 2,000,000 tons of high grade ore to their yearly production.

Inland Steel Co., through a subsidiary, Caland Ore Co., is developing a mine in the Steep Rock area. Scheduled to come into production in 1960, it will be an underground mine with an annual capacity of 3,000,000 tons.

Bethlehem Mines Corp. is presently developing the Marmora open pit mine in southeastern Ontario. Plans call for completion of a concentrator in 1954 which is expected to produce about 500,000 tons of concentrates annually.

Iron Ore Co. of Canada, in which six United States companies are interested, is presently pushing development of the Ungava Trough. Present plans call for shipment of 2,000,000 tons in 1954 and up to 10,000,000 tons by 1956. Opening of this project involved the building of a 358-mile railroad, construction of power plant, port and dock facilities.

In addition to the new properties being opened in Canada, Algoma Ore Properties, Ltd., are expanding production in the Michipecoten area and Dominion Ore and Steel Co. at their Wabana mines.

Imports from South America will in all likelihood play an important part in supplying the needs of the steel industry.

Bethlehem Steel Co.'s El Pao Mine, operated by the Iron Mines Co. of Venezuela, has been in production since May 1951. Production is expected to be nearly 2,500,000 tons for 1953 and will eventually reach an annual production rate of 3,000,000 tons per year.

In 1955 Bethlehem expects to start shipping from the El Romeral Mine in Chile. Annual production will be 1,000,000 tons of direct shipping ore.

United States Steel Corp.'s Orinoco Mining Co. expects to start shipping iron ore from Cerro Bolivar in 1954. Bringing this property into production involves the building of a 90-mile railroad, a new port and dock facilities. Estimated production is 5,000,000 tons of high grade ore per year with a possibility that it may be greater.

Other mining operators have shown an interest in South American properties and have done some exploratory work

Outside of the North American continent, Republic Steel is receiving about 1,250,000 tons of ore from the Bomi Hills reserves in Liberia in Africa.

The steel industry and mine operators are well aware of the need for increasing the iron ore supply for future years and that they already have made great strides in assuring an ample and dependable supply of iron ore. Projects now under way total at least 45,000,000 tons of iron ore yearly with the probability that they will be expanded to 55,000,000 tons per year by 1960. In addition, operators in known fields are constantly bringing in mines as replacements or expanding production through increased mechanization, better and more efficient equipment and new developments in beneficiation. Expenditures will run into tremendous figures. It is notable that these accomplishments have been made by private enterprise and private capital.



Northeastern states supplied 5,600,000 tons of iron ore to furnaces in 1953



Initial lignite dryer at Alcoa plant, Rockdale, Texas

Coal Research in 1953

World Wide Efforts Continue to Develop Basic Knowledge on Coal Utilization Both as a Fuel and as a Raw Material

By JOHN MITCHELL

Director of Research

WILLIAM L. GLOWACKI

Research Chemical Engineer Eastern Gas & Fuel Associates

THE amount of research work done on coal in the United States is small when compared with that done in such fields as petroleum or chemicals. This is true by all the conventional yardsticks: results reported, men engaged, money spent. Much greater effort is needed and must be made, either by government or private industry to in-

sure that coal will continue to be the basic supplier of our energy requirements. Our material standard of living—so much higher than the rest of the world—goes back to our greater per capita consumption of energy. In England and Europe coal as a source of energy ranks above oil and gas, and more research is done.

Research in the United States

Coal Properties

CONSTITUTION — Many workers attempted to unravel the real nature of coal both on a microscopic and on a molecular level during the year.

At the Ohio Geological Survey the program of coal petrography sponsored by the National Science Foundation was well under way. It is planned to determine the petrographic constitution for as many beds as pos-

sible and also to find out how various methods of preparation affect the distribution of coal components among the usual commercial sizes.

In previous years, work at the University of Alabama has suggested that "bright" and "dull" coals oxidize at different rates. This principle has been investigated as the basis for a chemical method for determining petrographic constituents. Agree-

ment was reasonably good with direct petrography on Alabama coals.

The Illinois State Geological Survey is active in the field of coal constitution. Some of the techniques being used are: petrography using polished surfaces, paleobotanic identification, reflectance measurements, x-rays, thermal analysis, and vapor adsorption.

At Pennsylvania State University an attempt is being made to relate expansion pressure and plasticity to such physical properties as internal surface area, pore size, and x-ray diffraction patterns. Various methods of oxidation were used to elicit the fundamental nature of coal.

RARE ELEMENTS—The anticipated and heralded demand for germanium did not materialize as expected. However, the search for germaniferous coals or coal ashes continued.

In 1953 the Eagle-Picher Co. analyzed thousands of samples from practically every major coal produc-ing area in the country. No bonanzas were struck and it appears that the recovery of germanium from coal under present conditions is not economically practical. Since germanium may be concentrated in fly ash, Eagle-Picher also examined ash from 60 power plants. No economic source was found. The U.S. Bureau of Mines is examining flue dusts from different spots in large power plant boilers in an attempt to find if there is a concentration of germanium from a classification mechanism in the combustion process.

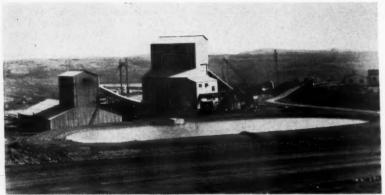
At Pennsylvania State University anthracites from all of the producing regions are being analyzed.

The problem of actually recovering germanium from a coal ash is being studied at Midwest Research Institute. Germanium in the ash is converted chemically to a volatile compound and is then condensed from the effluent gases. Work on this process has not yet advanced to the point of evaluating commercial feasibility.

Production and Preparation

RESERVES—Our reserves of energy coal are surely measured in centuries and perhaps in millennia. Just as surely, our reserves of high-quality coals are measured in decades and the best are already gone.

Since 1948, the Bureau of Mines has been active in making surveys of the recoverable reserves of coking coal. This very valuable work was continued and by the end of 1953 reports for 20 counties in the Appalachian region were published, with a number of other reports for counties in Kentucky, Maryland, Pennsylvania, Tennessee, and West Virginia in various stages of completion. In Ohio the State Geological Survey was studying the local scene with empha-



Experimental coal pipeline tests were completed by Pittsburgh Consolidation Coal Co.

sis on the lower Kittanning bed. Economic studies of the coal industry in the state were made and a survey begun of the present status of knowledge of coals in Ohio.

MINING.—In the United States coal mining is done well but needs to be done better if coal is to compete with other fuels. In this field research was aimed at increasing the output per man and at making the work easier and safer.

The Bureau of Mines has undertaken studies of the use of new mining equipment and methods. Results of the use of the German coal planer introduced into this country by the Bureau and operated cooperatively with Eastern Gas and Fuel Associates have been successful in improving recovery and productivity. Coal recovery in the long-wall operating panels was 85 percent, with an increase of 20 per cent in tons produced per man shift over the conventional mining methods in use at the test mine. In the anthracite region, induced caving, a method adapted from the metal-mining industry, has been successfully applied to the mining of steeply pitching beds.

The mining development of Bituminous Coal Research culminated in July, 1953, in the granting of license to the LeRoi Co. for the commercial development of the machine to be known as the LeRoi-BCR continuous miner. Active projects at present include: metal conveyor belt development, mine illumination, face transportation, and dust control. A recently devised roof-bolt indicator will be tried soon in the field.

Manufacturers of mining machinery continued to make their equipment better although nothing startling was announced. At the University of Kentucky a general study is being made of various types of mining machines in order to simplify the selection by the mine operator of the proper type of equipment. The different machines are being evaluated and classified with regard to their performance relative to height of seam, type of roof and bottom, and

occurrence of dips, rolls, and other defects of structure.

Field tests in an unused mine near Fairmont, W. Va., have confirmed laboratory results at Johns Hopkins University and indicate that practical and economic methods of halting pollution from coal mine acid wastes are almost within reach. It was stated that pilot tests in small areas gave promise that coal companies will be able to solve their problem by a simple chemical spray or dusting and that the treatment will last six to eight years.

PREPARATION.—The Bureau of Mines is studying several coal-cleaning methods foreign to the industry in the United States. These include the use of an artificial-bed jig and a heavy-medium cyclone for fine coal cleaning. Promising results have been attained in increasing cell capacity by introducing compressed air in a kerosene froth-flotation cell.

At Northwestern University one program of coal research includes: mechanical separations of coal, sizing, recovery of slimes, economic

methods of dewatering and drying, and special applications of the hydraulic cyclone. Manufacturers were active. As an example, Heyl and Patterson, Inc., did research and development with the dewatering, the filtration, and the mechanical and thermal drying of fine coal. Fittsburgh Consolidation Coal Co. successfully completed the operation of its coal pipeline demonstration plant at Cadiz, Ohio. This plant showed the technical feasibility of transporting coal in water slurry over considerable distances.

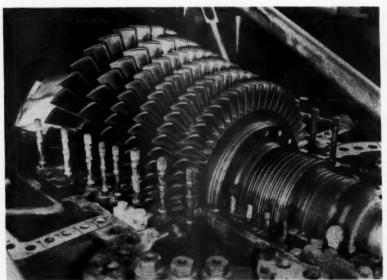
Utilization as a Fuel

Previous reviews have mentioned the increase in use of coal by electric power utilities and how this has stimulated improvements in apparatus efficiency both by empirical methods and by fundamental work.

In the field of steam generation Combustion Engineering, Inc., is engaged in a variety of research projects. These include a study of the abrasiveness of coals, the determination of the rate of ignition in a fuel bed, the variation of equilibrium-moisture content of lignite with temperature and relative humidity, and the flow characteristics of suspensions of pulverized coal in a confined air stream.

In 1953 the Coal Research Laboratory of the Carnegie Institute of Technology reported extensively on its fundamental work on the combustion of coal and coke. Forthcoming papers will deal with oxygen exchange reactions in the C—CO₂ system, the production of small flames with pulverized coal, rates of the coke—O₂ reaction, and the kinetics of the CO₂—C, and C—steam systems.

Intensity of competition between fuels for the small industrial plant



Rotor of BCR coal-burning gas turbine after first 178 hr of operation

market has shown the need for more attention by design engineers to the improvement of small coal-burning plants. The Fairmont Coal Bureau has developed several sets of typical designs and layouts. Wherever possible economic mechanization is introduced and leads to reduced capital investment. Bituminous Coal Research has sponsored the development of a packaged automatic coal-fired steam generator consisting of completely integrated components. At Pennsylvania State University work was continued on the design, material of construction, and testing of sprung arches for use with single retort stokers to improve combustion and reduce air pollution. The Anthracite Institute has continued its development of an automatic ash removal system for residential furnaces and has several successful installations in the field. A system based on the same principle has also been designed for commercial installations. The University of Rhode Island in collaboration with the Bureau of Mines has developed a process for the utilization of meta-anthracite in the production of mineral wool. A slagging gas producer fired with a meta-anthracite is charged with limestone and the molten slag is blown with steam.

Readers of this review are familiar with the history of the coal-fired gas turbine being tested by the Locomotive Development Committee of Bituminous Coal Research. In June, 1953, the Committee reported on a 750-hr test of the 4250-hp Allis-Chalmers unit. Combustion efficiency was consistently over 95 percent and the two combustion units were in excellent condition at the end of the test. A notable achievement was a reduction in the rate of dust emission to a point well below most air-pollution ordinances. A major difficulty was a gradual erosion of the turbine blades when operating at capacity. Fly ash removal devices were redesigned and new tests were under way at the end of 1953.

Non-Fuel Uses

For the past several years the major research effort of the Anthracite Institute has been on non-fuel uses. A filter aid, dubbed AnthraAid, has been developed with characteristics similar to diatomaceous earth.

At the University of Washington a laboratory-scale process was developed whereby for the first time an electrode carbon equivalent to calcined petroleum coke was prepared from low-ash anthracite from Glacier Field. Three major steps were necessary: sink-and-float beneficiation, treatment of the float with hydrochloric acid, and calcination of the ultra-clean coal.

Research was continued at Pennsylvania State University on the use of waste coals as fertilizers. Experi-



Preparing to draw coke from movable-wall oven at Research Laboratory of Eastern

Gas & Fuel Associates

ments were made with oxidation plus ammoniation at elevated temperatures. Work was also done on the recovery of sulfur from coal and coal refuse. There were two aims: one, the preparation of a high sulfur product for the chemical industry; the other, the preparation of a low sulfur product for the coal industry. Flotation was not promising but the results of gravity separation tests were encouraging.

Midwest Research Institute continued its cooperative effort with companies engaged in the sintering of clays with coal to produce lightweight aggregate.

Conversion

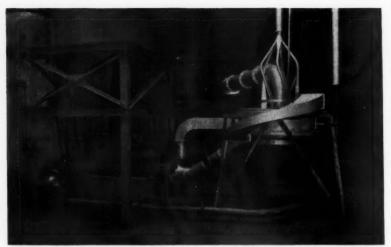
CARBONIZATION .- In the manufacture of coke the actual pressure developed on the walls of a regular coke oven during the carbonization of coal has always been of great importance to operating men. A wide variety of pilot-scale ovens have been invented for laboratory measurements of the pressure developed under specific test conditions in such models. The Illinois State Geological Survey has built a new experimental test oven for determining coking pressure. The new design is 17 ins, wide and is heated electrically. It will be put to work in testing Illinois coals in blends and for determining the operating factors that influence coking pressure. In a closely related field Koppers Co. has reported on the development of instruments and techniques for the measurement of gas pressures in the coal charge of a full-scale oven during coking. A linear relation between gas pressure and actual wall pressure as reported by British workers was confirmed in pilot-scale equipment and a similar linear relationship may exist in plantscale ovens.

The coal carbonization laboratory

of the Bureau of Mines in Pittsburgh continued its investigation of Appalachian coals in order to determine their suitability for the manufacture of metallurgical coke. As in the past, the BM-AGA carbonizing apparatus was used. At the University of Maryland a study was made of some of the thermal changes involved in coal carbonization and of the effect of various pretreatments on these changes and upon coke structure. Oxidation up to a certain critical value increased the quality of the coke produced; after this point the coking property began to be destroyed. At the University of Wyoming work was done to test the theory that the coking quality of a coal is related to the molecular weight of the colloidal material extracted by ethanol. A program of development work at Montana State College is aimed at finding a local coal which by means of washing or other treatment will produce a coke of suitable physical properties and low ash content.

Carbonization of lignite in a fluidized bed has reached commercial full-scale development. The first 30-tph fluidized carbonizer for lignite was approved for construction at the Alcoa plant at Rockdale, Texas, and is based on a process developed at the Denver Station of the Bureau of Mines. It is significant that this process makes possible economical use of low-rank coals for power generation in an oil-and-gas producing area.

Research in the field of low temperature carbonization was active. Throughout 1953 the Research and Development Division of Pittsburgh Consolidation Coal Co. operated a large low-temperature carbonization pilot plant utilizing the fluidized technique in effecting continuous distillation of highly coking coals. Considerable work was also done on the identification, separation, and conversion of components of low-tempera-



Vortex combustion chamber as designed in England for a coal-fired gas turbine

ture tar. The fluidized technique was also used at the Southern Research Institute in a study of low-temperature carbonization for the Alabama Power Co. At Northwestern University a research project is under way on the low-temperature carbonization of lignite in a single retort. It is expected that the experimental methods, if proved, will be applied to substitutions and bituminous coals.

Low temperature carbonization has been studied at the University of Kentucky since 1944. Current activity deals with the mutual correlation of the softening temperature, the temperature of maximum volatilization, and the release of exothermic heat. Methods of evaluating the quality of coke continued to interest many workers. The Technical Committee of the American Iron and Steel Institute and a committee of the American Coke and Coal Chemicals Institute had reported in a preliminary way on their well-known and extensive coke evaluation study. The complete text of the long-awaited full report including detailed statistical analyses was issued in December of 1953.

GASIFICATION.—The American Gas Association published a critical survey of methods of making a high-BTU gas from coal (Research Bulletin No. 6). The program of experimental work on powdered coal gasification carried out at the Institute of Gas Technology was continued and substantially completed.

Feasible designs of gasifiers for the conversion of coal dust entrained in a mixture of steam and oxygen have been developed and tested by the Bureau of Mines. Additional operation of such gasifiers, particularly at elevated pressures, is in progress to determine the effect of the controlable process variables. Laboratory research has begun on processes for producing synthesis gas from coal, using air rather than oxygen.

At the Coal Research Laboratory of the Carnegie Institute of Technology work has been continued on gasification in both fixed and fluidized beds. The results indicate a common mechanism for gasification reactions; namely, a rapid and reversible formation of an oxygen complex followed by its slow decomposition.

At Battelle Memorial Institute emphasis was placed on the investigation of producers, of both the downdraft and updraft types. It was demonstrated that producer gas from a commercial unit fired with coal could be used in a small diesel engine with pilot-oil ignition.

Among coal producers Pittsburgh

Consolidation Coal Co. continued its fundamental investigations on the carbon-steam reaction. Sinclair Coal Co. is continuing basic laboratory research pertaining to underground gasification and is making plans for the future.

HYDROGENATION.—At the Bureau of Mines laboratory research on the primary reaction in the hydrogenation of coal has led to construction of a bench-scale pilot plant for converting coal to highly aromatic gasoline in one step. The results are attractive, but a long road of engineering and development work must be traveled before the feasibility of this procedure can be evaluated.

The Coal Research Laboratory has continued to report extensively on its well-known work on coal hydrogenation and the characteristics of the products. Effect of a preheat treatment of the charge has been studied and recently hydrogenations were made of chars produced by the molecular distillation of Pittsburgh seam coal.

OXIDATION—Fundamental studies by the Illinois State Geological Survey on the nature of the reaction of coal with oxygen included a comparison of coals with known representative phenolic compounds and it was shown that oxidation of such structures may result in condensation as well as degradation reactions.

The Coal Research Laboratory continued studies aimed at the characterization of the acids from coal oxidation

Research Abroad

In reporting on coal research abroad it was thought more useful to the reader to organize the following brief summaries by country and institution.

Great Britain

THE NATIONAL COAL BOARD—When the National Coal Board took over the mines in 1947 only ten scientists and 20 assistants were available for research work. Since then great progress has been made and the Board now has two research establishments, each with a strength of about 350.

The establishment at Isleworth is concerned with mining engineering, and current work is on underground problems such as coal winning and transport, control of the working environment, instrumentation, and safety. Notable progress has been made in the measurement and control of methane, in the hydraulic transport of coal, and in the development of a walking pit-prop, a percussive coal plough, and improved forms of rock drill.

A sister establishment at Stoke Orchard deals with the preparation of coal for market, thermal treatment, briquetting, and other aspects of the beneficiation of coal. Developments included: a large-scale carbonized briquette process, a mobile fines washery, and new dewatering techniques.

FUEL RESEARCH STATION OF THE DEPARTMENT OF SCIEN-TIFIC AND INDUSTRIAL RE-SEARCH-Since Britain's reserves of good coking coal are small, work is being done on the production of metallurgical coke by carbonizing blends of good quality coking coals with coals of weakly caking properties. It has been found that up to 60 percent of such extenders may be incorporated into the blend without making the coke unsuitable for metallurgical purposes. Work was also continued on the generation of water gas from non-caking coal and semicoke, utilizing the fluidized solids technique.

Experimental work was carried out with three types of combustion cham-

ber for burning solid fuel in industrial gas turbines. One was a straight through type of combustor, the second a "Vortex" combustion chamber in which centrifugal force is employed to obtain the relative motion necessary for a very high rate of heat release, and the third, a "Cyclone" chamber. (This is being developed by BCURA under contract.)

Other research at the Station included work on the Fischer-Tropsch synthesis, on the constitution and grindability and surface chemistry of coal, on deposits in boilers, on the removal of sulfur compounds from gas, and on the prevention of smoke.

BRITISH COAL UTILIZATION RESEARCH ASSOCIATION — BCURA devoted considerable effort to domestic heating with emphasis on the development of rational methods of testing appliances, on the minimizing of smoke production from bituminous coal, and on the devising of new central heating systems.

Burning of fine coal by the cyclone method has been investigated in connection with an effort to develop a coal-fired gas turbine. The blocking of air inlets to the cyclone chamber by ash accretions has now been largely overcome. A serious remaining problem is the carrying forward of material that forms bonded deposits on turbine blades.

Field studies on gas producer practice were continued with the achievement of higher Btu as the main goal. The Association's utilitarian researches are being backed up in the laboratories by much fundamental work on such topics as: the mechanism of smoke formation and destruction, the mechanical properties of coal, the assessment of dust in flue gases, and coal structure by X-ray diffraction and solvent techniques.

BRITISH COKE RESEARCH AS-SOCIATION-Fundamental investigations have dealt with the reactivity of carbon, the apparent molecular weights of the pyridine soluble constituents of coal (found noncolloidal), and the phenomena of plasticity and the formation of the plastic layer during carbonization. Coke breakage is being studied as a preliminary to the setting up of a rational test procedure. Coal blending for carbonization has been studied in a 500-lb test oven, and in miniature ovens of 1/4- and 1-cu-ft capacity. As part of this work, a miniature shatter test has been developed.

Very interesting work was done on the influence of the physical properties of coke on blast furnace and cupola practice. Up to 1000°C the temperature of coke had little or no effect on the size distribution of coke broken at high temperatures although hot coke was weaker than cold. It was learned that coke is not readily wetted by blast furnace slag at 1500°C. Field tests on a full-sized cupola have been initiated and the importance of coke size in foundry practice will be studied.

The Association's well-known work with a movable-wall oven has been completed. Further investigations have been initiated concerning the softening range of coals, the movement and size of the plastic zone, and the relation between fissuring and carbonization conditions.

Western Germany

In Western Germany most coal is mined by the longwall method, using rock power (breaking down of the coal by the weight of overburden.—Ed. note.) for easy working. In this field attention is being directed to the further application of coal ploughs to harder coals, thinner seams, and disturbed strata. In longwall working the supporting system and method are of special importance. Design of the supports to allow mechanical shifting is an objective of extensive current development work. Research in the field of haulage is directed toward greater utilization of curvilinear conveyors.

Coal preparation has received attention. Recent innovations include a drum separator for large sizes, a vibrating screen centrifuge, the screening of wet coal within narrow size limits, and the sizing of fines and middlings in hydro cyclones.

In the field of carbonization, work was done on increasing the amount of coal charged to ovens with increases of eight percent having been obtained. Work was also done on gas purification—removing H₂S by using NH₄OH—and on the high-pressure refining of benzene.

Gasification has been a field of lively activity. The high-pressure gasification of bituminous coal has proceeded to the point where a plant is being built. Pulverized-coal gasification was installed commercially at Typpi Oy, Finland. The Basf-Flesch-Demag process was further developed. Three companies are working on the low-shaft furnace; "iron coke" is being utilized in slagging producers to make heating gas and pig iron.

In the field of coal utilization for combustion the trend was toward the slagging type of combustion chamber. Development work on smaller installations, however, such as for house heating, has not been neglected. Attention was given to automatic control and declinkering, and to the testing of various types of briquettes. chars, and cokes.

France

CENTRE D'ETUDES ET RECHER-CHES—At this institution the formation of fissures in coke has been studied both theoretically and experimentally and has been related to the coefficient of contraction at the resolidification point and to the thermal gradient. A process has been developed for the production of a char from high volatile Lorraine coals. The fluidized technique was used and very high tar yields were obtained.

In the field of combustion, attention was mostly directed to the utilization of high volatile coals in home heating appliances.

In the field of gasification, Cerchar has collaborated in pilot-plant tests of the Panindco process (related to the Schmalfeld process). It can now be considered perfected on the scale of one tph. The work on underground gasification at Djerada, French Morocco, in 1951-52 has been continued

(Continued on page 95)



Chemical processing of coal in all glass pilot plant at central laboratory of Staatsmijnen. The Netherlands



Output from DMPA-stimulated projects will make its first real impression in 1954

Copper

For Long Future, Consumption Will Continue Upward Trend After Interruption Due to Unsettled Conditions

By HELENA M. MEYER

Assistant Chief Base Metals Branch U. S. Bureau of Mines

COPPER price controls in the United States, which caused domestic and foreign prices to be so widely different that they were the outstanding feature of the copper industry in 1952, were removed in February, 1953. Prices, nonetheless, continued to be the outstanding feature, owing to reluctance of the Chilean Government to accept the level of prices established throughout the rest of the world. The period of inadequate supplies passed, at least temporarily, in 1953 and producers' and consumers' inventories made noteworthy gains. The year was marked also by the abandonment of the major part of Governmental controls on copper.

At the beginning of the year the controlled price for domestic electrolytic copper, delivered Connecticut Valley, was substantially 24.5 cents a lb. There were certain exceptions resulting from the fact that some smaller producers had higher ceilings because of higher base prices, and that some had maintenance-of-production subsidies. The price for foreign copper, on which there was no control, at the time was 36.5 cents. Domestic copper price controls were abandoned February 25. There was considerable confusion, with domestic metal selling for 271/2 to 341/2 cents a lb, but by the end of April quotations for most of the domestic copper sold were 291/2 to 30 cents a lb, and this level prevailed substantially until the end of the year. Foreign prices had sharply exceeded those in the United States after the General Ceiling Price Regulation was invoked early in 1951. After February prices for foreign copper, except Chilean, generally approximated the

United States domestic price. The price for Chilean metal continued at 35½ cents a lb, f.a.s. Chilean ports, or at about 36½ cents in the United States, until December. As a result of the wide price differences, Chilean metal accumulated. In August the Chilean Government formally requested the United States Government to purchase the accumulation for the strategic stockpile.

The general feeling since negotiations began was that much of the Chilean metal in question would find its way into the United States stockpile. Early in December Chilean copper, exclusive of the stocks under negotiation, became available at 30 cents, Connecticut Valley.

IMC Dissolved

It was evident early in 1953 that United States supplies of copper soon would be adequate for total requirements. As a result, allocation of copper supplies, except that part required for military and Atomic Energy Commission needs, was scrapped in February. The Copper-Lead-Zinc Committee of the International Materials Conference, which had allocated copper consumption on an international basis, was dissolved at the end of March.

Foreign copper began flowing to the United States in increasing quantity after the United States Government in mid-1952 permitted passing on to consumers most of the higher costs of foreign metal. In the latter part of 1952, 58 percent more copper was imported than in the early half, and the increase in over-all supply greatly improved the United States supplyrequirement situation. The heavy movement of copper to the United States continued in 1953; in the first 10 months of the year, 612,000 tons of copper in unmanufactured form was received compared with 486,000 tons in the same months of 1952. The increase took place despite falling receipts from Chile because of the noteworthy price differentials already mentioned. Beginning in March substantial quantities of copper from Northern Rhodesia, Belgian Congo, and the Union of South Africa were offered for sale to United States buyers. Receipts from Northern Rhodesia for the 12 months doubtless trebled the 28,000 tons received in 1952.

U. S. Production Holds Own

Domestic production, meanwhile, was unable to more than hold its own; estimated mine production was virtually identical with the 925,000 tons for 1952. United States copper production comes largely from low-grade ores that cannot be mined profitably except on a very large scale; the average grade of ore produced in 1952 was 0.85 percent copper, and it was un-

doubtedly slightly lower in 1953. New production, as a consequence, requires large capital expenditure for extensive development work, metallurgical investigation, and plant construction. Production, therefore, cannot be increased quickly, and Defense Production Act stimulation had little effect on 1953. It will make its first real impression in 1954. The major increase in United States production came from the Greater Butte Project of the Anaconda Copper Mining Co., in Butte, Mont. Production from that state totaled 79,790 tons in 1953 and exceeded that in 1952 by 17,842 tons, or 29 per cent. Nevada's production of 62,000 tons was eight percent above These increases were offset by small decreases in a number of localities, notably Arizona, where output dropped from 395,719 to 392,300 tons in 1953; New Mexico where it was 76,112 and 70,300 tons, and Utah where it was 282,894 and 269,400 tons, respectively. The Anaconda Copper Mining Co. began to produce copper from its oxide orebody at Yerington, Lyon County, Nev., at the end of 1953.

More Scrap Processed

Although higher prices failed to bring out greater mine tonnages in 1953, they did result, as anticipated, in increasing the quantities of refined copper recovered from scrap. Output of refined copper from scrap at primary and secondary plants averaged 13,800 tons monthly in 1951 and 12,800 in 1952. In March to May 1953 it averaged 21,300. For the year as a whole, output was 210,000 tons. Annual tonnages for 1951 and 1952 were 165,700 and 153,700, respectively.

New supplies of refined copper from primary and secondary sources were estimated at 1,780,000 tons in 1953 compared with 1,679,000 tons in 1952 and 1,612,000 in 1951. The totals, in

	1951	1952	1953 (Estimated)
Refined copper from primary, domestic, and for- eign materials Imports, refined Copper recovered from scrap in refined form	1.207	1,178 347 154	1,280 290 210
Total	1,612	1,679	1,780

thousands of short tons, are shown above.

Additional unalloyed copper and alloyed copper from scrap totaled 766,000 in 1951, 749,000 in 1952, and an estimated 731,000 in 1953. Of the total copper produced from scrap, only 458,000, 415,000 and an estimated 409,000 tons, respectively, represented recovery from old scrap.

Resume Trading on Exchange

With greater over-all supplies available and with controls substantially removed, consumption of refined copper rose sharply in the first six months of 1953 and averaged 138,000 tons monthly compared with an average of 123,000 in 1952 and 118,100 in 1951. Consumption declined, notably in the latter part of the year, conforming with the pattern set by industry in general, and averaged 122,000 tons monthly for the year as a whole. Consumption of primary and secondary copper in refined form was 1,417,000 tons in 1951, 1,480,000 in 1952, and an estimated 1,460,000 in 1953.

Producers' stocks of refined copper were 26,000 tons at the beginning of 1953 and had almost doubled by year end. Blister and materials in process of refining were 185,000 and an estimated 225,000 tons at the beginning and end of the year. According to the United States Copper Association, fabricators' stocks of refined copper (including in-process copper and primary fabricated shapes) were 331,000

on January 1, 1953, and 351,000 tons on November 30.

Further evidences of the easing in copper supplies in 1953 were the reopening of trading in copper on the New York Commodity Exchange June 1, after a recess of two years, and the resumption of free trading on the London Metal Exchange on August 5, after a lapse of 14 years.

Assist Companies

Government assistance to copper mining companies under the Defense Production Act did not maintain the pace set in 1952. The major contracts in 1953 were as follows:

February—Contracted with Miami Copper Co., Arizona, for 115,000 tons of copper from ore averaging 0.5 percent copper at a floor price of 27.35 cents.

March—Agreement with Falconbridge Nickel Mines, Ltd., Canada, for 100,000 tons of nickel, 26,000 tons of copper by December 28, 1958, and significant quantities of cobalt.

May—Agreement with Banner Mining Co., Arizona, for 6480 tons of refined copper over a three-year period from about May 1, 1954, at 31 cents, and options on all molybdenum at market.

May—Original loan of £3,000,000 to Chibuluma Mines, Ltd., Northern Rhodesia, increased by not more than £2,000,000, with loans to be repaid in metals.

June—Contracted with International Nickel Co. of Canada, Ltd., for 60,000 tons of nickel and 50,000 tons of copper from a new project in Sudbury District.

June—Contracted with Rhodesia Congo Border Power Corp., Ltd., Northern Rhodesia, granting loan of \$22,400,000 and purchase contract for enough copper and cobalt to discharge borrowers' obligation.

June—Contracted with Copper Creek Consolidated Mining Co., Arizona, for 2750 tons or more copper from leaching ore in place.

August—Contracted with Copper Range Co., Michigan, for nearly 4000 tons at 32 cents; replaced old overthe-ceiling contract at 33.8 cents. This was cancelled automatically in February when copper price controls were dropped.

October—Contracted with Riviera Mines Co., Arizona, for 1500 tons at

(Continued on page 102)



Domestic production held its own



During 1953 the percentage of strip coal production rose in terms of total production

Strip Mining

Larger and More Efficient Equipment Coming as Industry Faces a Diminishing Market in the Immediate Future

By W. H. COOKE

President

Little Sister Coal Corp. and Little Sister Farms, Inc.

THE strip mining segment of the coal industry is perhaps the oldest. No doubt the original production of coal, after discovery in about 1672 at Cape Breton in Canada and in Illinois, was by stripping from the outcrop. The development of strip coal in recent years is shown in table I. It is interesting to note that in 1952 the percentage of strip coal in terms of total production increased. In the key strip mining states of Illinois, Ohio and Indiana the percentage increase was substantial and in both Ohio and Indiana amounted to 60 percent. In 1953 this percentage increase will have continued to increase, both in the United States as a whole and in the key states. The reduction in over-all tonnage in 1953 hit deep mining much harder than strip. Production from strip mines probably ran close to or exceeded 1952 figures. In 1953 strip production in Illinois was approximately 16,400,000 tons-about equal to 1952 production. The total coal production in Illinois in 1952 was 32,000,-000 tons below the peak production of 77,000,000 tons in 1944. In 1944 strip production also had its peak of 18,000,- 000 tons. With 1952 strip production at 16,700,000 tons, the loss from the peak was only 1,300,000 tons out of a total loss of 32,000,000 tons of coal production for the state.

Strip Production Rises

Nationwide a somewhat similar condition exists in that since 1941 national production by strip mining has increased from 55,000,000 tons to 109,-000,000 tons in 1952 with the percentage of total production rising from 10.7 percent to 23.3 percent during the period. In 1952 Ohio was the largest producer of strip coal with Pennsylvania second and Illinois third. Ohio's production has increased from 7,300,000 tons in 1941 to 22,100,000 tons in 1952 with the percentage of total production going from 24.9 percent in 1941 to 61.2 percent in 1952. Pennsylvania has also shown substantial gains, going from 6.5 percent of total production in 1941 to 22.8 percent in 1952. From the peak of 619,-576,000 tons in 1944 the national production has fallen off 152,736,000 tons. whereas the strip production has increased from 100,898,000 tons to 108,910,000 tons during the same period, a gain of 8,200,000 tons. While the coal industry in general is suffering from a loss of business, the stripping industry is certainly holding its own or improving its production slightly. Table I, showing production of the larger strip mining states, illustrates this well.

Since 1941 the production per man day in the strip mines has increased from 15.59 tons to 16.77 tons in 1952, and during that same period the deep mines have increased their production per man day from 5.20 tons in 1941 to 7.47 tons in 1952. In Illinois the strip mine production per man day in 1952 was 20.48 tons and the deep mine production was 9.41 tons, both somewhat higher than the national average.



Larger equipment with greater range will no doubt be available in the next few years

To give an accurate forecast for coal in 1954, we must realize that coal, a basic commodity, will prosper as our whole economy prospers. Trends in our economy and the competitive situations give us the key to the future of coal. Last year bituminous coal consumption was approximately 450,000,-000 tons-the largest consumer being the electric utility industry. Their consumption should be up in 1954. Probably it will not rise more than 5,000,000 tons. Over the period of the next few years, the utility increased consumption should run close to 30,-000,000 tons. On the debit side, railroad business will continue at an accelerated downward rate. In the other categories consumption will pretty well depend upon the general economic trend.

The trend of the coal industry in 1954 can be best characterized by a continuing and diminishing market with increased competition having the effect of accelerating progress in mechanized mining. The incentive to increase productivity and lower cost is making itself felt in the coal stripping industry.

Larger Machines Coming

Reserves of coal underlying thin overburden are being exhausted and it is necessary to increase the range of stripping equipment if higher ratios of overburden to coal seam are to be mined. For several years, work has been progressing on designs of larger shovels and draglines and it is certain that large machines will be built. The industry will no doubt have available in the next few years shovels with up to 55-cu-yd capacities and a range considerably greater than is possible with present equipment. The largest present machines weigh about 1600 This newer equipment will weigh about 2500 tons. In addition to being physically larger, machines will have radically improved performance resulting from the application of much greater horsepower to the various motions. This combination, with the application of high strength alloy steels, will materially increase speed and

One of the outstanding contributions to efficiency in recent years has been the development of rotary overburden drills using an air blast for the removal of the cuttings. These machines are rapidly replacing churn drills and auger drills. The speed with which the drilling can be done results in lower cost, better application of the explosives and improved fragmentation which, in turn, increases the output of the stripping units. The trend is toward increasing the size and capacity of these new rotary drills which will permit heavier charges of explosive and further reductions in the drilling and blasting cost. Present

TABLE I—PRODUCTION OF COAL 1941 TO 1952, INCLUSIVE, AND AMOUNT PRODUCED BY STRIP MINING AND PER CENT OF TOTAL SHIPPED BY STATES AND UNITED STATES

Thousand Tons)

_	Percent girds	56.6	57.0	53.1	50.5	53.5	54.5	55.8	58.3	58.0	53.8	56.5	59.8
Indiana	Strip Production	12,730	14,476	13,310	14,126	13,464	11,826	14,195	13,894	9,592	10,740	10,997	9,773
	Total Production	22,484	22,388	25,064	27,962	25,183	21,697	25,449	23,849	16,550	19,957	19,420	16,350
nia	Percent Strip	œ	1.7	8.8	2.00	9.4	10.3	12.5	11.2	11.2	0.6	8.0	7.5
West Virginia	Strip Production	1,099	2,613	880'9	12,841	14,246	14,937	21,994	18,951	13,747	12,986	18,028	10,174
W	Total Production	140,250	155,881	158,804	164,704	152,035	144,020	176,157	168,862	122,611	144,116	163,310	141,713
	Percent girtz	60	2.3	3.1	7.4	9.6	11.0	12.5	15.1	16.6	17.8	15.6	16.4
Kentucky	Strip Production	1,249	1,436	1,945	5,274	6,695	7,354	10,572	12,384	10,360	13,978	11,727	10,868
*	Total Total Total	53,710	62,231	63,211	71,356	69,593	66,553	84,241	82,084	62,583	78,496	74,972	66,114
nia	Percent girtz	6.5	8.0	12.7	15.4	20.8	25.2	25.2	26.6	25.0	25.0	21.6	22.8
Pennsylvania	Strip Production	8,430	11,457	17,993	22,532	27,708	31,687	37,075	35,771	22,231	26,427	23,356	20,298
I	Tetal Troduction	130,240	144,073	141,050	146,052	132,965	125,497	147,079	343,542	89,215	105,870	108,164	89,181
	Tercent girtz	24.9	28.4	29.4	34.4	41.2	44.0	46.2	52.4	59.2	60.3	0.73	61.2
Ohio	Strip Production	7,315	9,325	9,490	11,663	13,484	14,207	17,360	20,295	18,323	22,775	21,610	22,149
	Total Total noitsubor T	29,319	32,764	32,255	33,877	32,737	32,314	37,548	38,708	30,961	37,761	37,949	36,208
	Percent girth	25.5	24.3	22.9	23.4	23.2	23.9	26.4	27.0	29.4	31.3	33.8	36.5
Illinois	Strip Production	13,946	15,835	16,618	17,980	16,909	15,162	717,717	17,584	13,893	17,612	18,297	16,705
	Total Total notice of the Total Control of Con	54,708	170,50	72,631	76,791	73,011	63,469	02,060	65,342	47,208	56,291	54,200	45,790
	Percent giriz	10.7	11.5	13.5	16.3	19.0	21.2	22.1	23.3	24.2	23.9	22.0	23.3
United States	Strip	55,072	07,203	79,685	100,898	109,987	112,964	139,395	139,506	106,045	123,467	117,618	108,910
Uni	Total Production	514.149	582,693	590,177	619,576	577,617	533,925	630,624	599,518	437,868	516,311	533,665	406,841
												de:	
	Year	1941	1942	1943	1944	1945	1946	1947	1948	1949			1952

TABLE II—CONSUMPTION OF BITUMINOUS COAL IN THE UNITED STATES

	1953	1952	Estimated 1954
Electric Power	112,000,000	103,273,000	117,500,000
Cement Mills	8,392,000	8,078,000	7,500,000
Other Industrials	96,725,000	95,863,000	92,000,000
Total	217.117.000	207.214.000	215,000,000
Coke Ovens		97,096,000	104,000,000
Steel & Rolling Mills	6,221,000	6,820,000	6,000,000
Total	119.234.000	103,916,000	110,000,000
Railroad		37,962,000	23,500,000
Retail Dealer	60,581,000	68,393,000	60,500,000
Exports-Overseas		26,612,000	11,000,000
Exports—Canada	19,500,000	20,984,000	19,000,000
Total	122,090,000	153,951,000	116,000,000
Grand Total	458,441,000	465,081,000	441,000,000
Production	451,700,000	466,841,000	441,500,000
Source: Appalachian Coals Inc.			,000,000
Stock on Hand-December 31	70.000,000	76,475,000	

machines are capable of drilling from 400 to 1000 ft per shift in rock and shale and there is every reason to expect improvements in this performance.

The development of truck engines having ratings up to 400 hp makes possible the design of higher capacity, higher speed haulage units. Trucks capable of carrying up to 70 tons have been built but it is only recently that high capacity trucks have been equipped with a sufficient amount of power to permit them to operate at speeds comparable to those attained by lighter units. In strip mine haulage, the tendency is now toward trucks of about 50 tons capacity designed to operate at high speed over smooth roads. Haulage cost savings up to 50 percent are being realized by the use of this type of equipment. The major problems in the design of this kind of equipment are the development of durable high-powered engines, the development of transmissions with adequate capacity for the severe duty and the improvement of tire design to withstand the high temperatures and high speeds encountered.

Paralleling the development of improved haulage units is the necessity for providing better roads. The elimination of steep grades requires that much more attention be given to the design of the roadways and a material increase in the yardage moved in mak-

ing roadway cuts and fills is being experienced. Serious attention is being given to hard surfacing.

Competition Keen

From without, coal can expect continued competition from residual oil. Plans of the natural gas industry call for four billion dollars in pipeline development through 1956. The coal industry must organize to meet these situations.

Increased utility consumption has brought with it captive situations and price pressures that are disturbing to independent commercial operators. The utilities are the industry's best customer. On the other side of the shield, coal is the utilities' best and most economical source of supply. It is their great resource. Cooperation from the utilities is necessary for an economically strong coal industry.

A bright future lays ahead of coal in our expanding chemical and atomic age. This future, however, as the economy expands, will bring with it a continuing revolution in distribution and mining methods. If we are thinking of seven hundred million to one billion ton production years then we must think of large operations with



New recreation areas are one result of rehabilitating mined areas

Higher ratios of overburden to coal are being mined

conversion plants at the mine. Western coal seams and lignite deposits will play an increasingly important role. If the industry is to fit its operations in the future pattern, a number of technological changes will be necessary.

However, for the immediate future we must live with the present economy and social state of the industry. We will work in a diminishing market and make our profit with more efficient equipment and by doing a better job of selling our product. The trend will be larger and fewer operations with consolidated and cooperative sales effort if we are to build a healthy industry.

Reclamation

Accomplishments of the strip coal mining industry in the past and its possibilities in the future are not con-



The agronomist is becoming part of the strip mining team as more and more stripped land is raising crops or feeding stock

fined solely to the field of coal production. In addition, in practically all of the major coal strip states the program of land reclamation and land utilization has made rapid strides.

Up to December 31, 1952, the strip mining companies in Illinois had stripped 60,000 acres of land in producing 332,000,000 tons of coal since stripping began in commercial quantities in about 1910.

Strip mine companies have been faced with a problem in connection with the stripped land and Illinois took a lead in research to ascertain the best uses for the land. In the early 1930's it was thought that the stripped banks could best be used for forestry and each year hundreds of thousands of trees were planted on spoil banks. At the present time in excess of 12,000,000 trees have been planted on 12,000 acres, or roughly 20 percent of the total area stripped is now growing trees.

In 1946, through the Central States Forest Experimental Station, a research program was instituted, involving the states of Illinois, Indiana, Ohio, Kentucky and Missouri to ascertain the best types of trees to be planted and under the various conditions and locations, and different types of spoil banks. This was a five-yr program and is still being carried on, although the five-yr report has been printed as University of Illinois Agricultural Experimental Station Bulletin 547, issued January 1, 1952.

Beginning about 1939, grasses were planted on some soil banks in Fulton County, Ill., in an endeavor to develop pasture for grazing purposes and, strangely enough, the grass grew in abundance.

Research Pays Off

In 1946 it was felt that research was necessary to ascertain the different types of grasses and legumes which would grow best on the different kinds of spoil banks, and a research program was entered into with the University of Illinois Agricultural Experimental Station on agronomic species on the spoil banks. As a result of this research program it was found that the stripped banks in some areas

were especially suitable for the growth of certain kinds of grasses and legumes. As a result today in Illinois 17,000 acres have been planted with grasses and legumes to be used as pasture, and in 1952 10,000 acres were being pastured with various kinds of livestock.

In 1950 the Little Sister Coal Corp., through the Little Sister Farms, began grading their spoil banks to the point where farm machinery could be used, and in Illinois at the present time some 1800 acres of spoil banks have been graded to the point where farm machinery can be used and in addition roughly 3000 acres have had the ridges or tops struck off for pasture development. Little Sister Farms was one of the pioneers in this development.

Experiments are still being carried on in the growing of agricultural crops other than grasses and legumes; namely, corn and small grains, and 300 acres are being used for that purpose. In excess of 5000 head of livestock are now being grazed on the spoil banks. One company in Illinois has devoted some acreage to orchards, and some of the best apples and peaches in the State are now being produced on the spoil banks. In addition, 4350 acres are now being used for recreational purposes in which the land, including certain lakes, has been turned over to sportsmen's clubs and other groups.

Companies have created 2500 acres of new lakes and more than 1500 acres of that stocked with fish.

Indiana has planted 31,000,000 trees on 33,000 acres. West Kentucky has planted 3,000,000 trees on 2300 acres. Pennsylvania has planted 22,000,000 trees on 18,000 acres. Ohio has planted in excess of 6,000,000 trees on 6000 acres, and has seeded approximately 5000 acres in grasses and legumes. Kansas has over 7000 acres in pasture, and between 5000 and 6000 acres have been seeded and are being used in grazing livestock in Missouri.

Coal Research

(Continued from page 89)
and ignition of another trial was expected late in 1953.

The Netherlands

STAATSMIJNEN IN LIMBURG—Fundamental work was done on coal genesis, on the development of a chemical structural model, and on an examination of the course of the principal reaction processes. Through measurements of physical constants—especially density and refractive index—a structural model was derived for the maceral vitrinite during the various coalification stages. The number of carbon rings as well as the percentage of carbon present in the form of aromatic rings could be found.

These investigations have shown

that the structure of coal is of a turbostratic character. Packings of graphitic clusters occur, which, in the course of coalification, grow in size whereas the content of the nonaromatic fraction decreases.

Other Countries

Research on coal went forward in Australia, Canada, Japan, the U. S. S. R., and elsewhere throughout the world. The authors regret that they were unable to make this review complete by including new information for all countries.

More Research Needed

We are an energy-consuming nation and our greatness—or lack of it—has depended much on our intensive application of power instead of muscle. Certainly coal represents our major reserve of fuel and of energy and of power. We need to use more energy and more power. Coal will play the major role in the continuing development of our economy and of our civilization, but only if we can win it more cheaply, more efficiently, and more easily. Research can make this possible, if enough is done.





Underground mechanization has been a major factor in keeping mining costs from rising even higher

Lead and Zinc

Low Prices in Spite of High Demand Mark Year. Industry Seeks Relief from Excessive Imports

By CHARLES F. SCHWAB

Manager, Industrial Relations
Bunker Hill & Sullivan Mining & Concentrating Co.

THE year was prefaced by the precipitous price declines in the last two quarters of 1952. During this time lead dropped from 19 cents to 131/2 cents and zinc plummetted from 191/2 cents to 121/2 cents. Lead recovered slightly from its 1952 low and the price at the beginning of 1953 was 14% cents. Zinc at the beginning of this year was 13 cents. During 1953 the price of both metals continued to decline. Lead fell to 12 cents in April but recovered gradually in succeeding months up to 14 cents in July. It dropped back to 131/2 cents in September and remained at that price until the close of the year. Zinc continued its decline during the year and was 10 cents in September, where it remained for the balance of the year. With an average price during 1953 of 13.489 cents lead and 10.855 cents zinc, the year set an undesirable record for curtailment, mine closures, reduction in production, and lay-offs as many domestic producers were caught in the economic squeeze between high costs and low prices. Indicative of this condition are the average prices and the "miners' shift rate" tabulated below.

Such a tabulation does not take into account the ever-increasing cost of "indirect wages" or "fringe benefits." When these are added to base wage rates, the total wage cost per shift, direct and indirect, for 1953 is in the range of \$18 to \$19. Of total production costs, labor costs represent at least 60 per cent. The balance of production costs, such as supplies and materials, have also increased proportionately.

Probably 1953 saw another record set, one for statements, investigations, and hearings on lead and zinc. In April the House Select Committee for Small Business held hearings in Denver, Phoenix, San Francisco and Spokane. This Committee's report emphatically supported the fact of the distressed conditions of the lead-zinc industry and recommended prompt relief. Then in May the House Ways and Means Committee held hearings on the lead-zinc sections of HR 4294 (Simpson Bill) and its report was favorable on the lead and zinc sections of the bill.

In the last rush before adjournment, the original Simpson Bill was split into two parts. One part, which the Administration badly wanted, was passed. It continued the Reciprocal Trade Agreement Act for a year. In addition, it established a 17-man Commission—now popularly known as the Randall Commission—to study the whole field of world trade. The second part of the original Simpson Bill, which contained the lead-zinc section, reached the floor of the House but was

	Average Me	etal Prices	Miners'
	Pb	Zn	Shift Rate
January 1, 1946			\$ 8.50
1946	. 12.043*	13.322*	9.61
1947		12.447*	10.46
1948	. 18.043	13.589	11.42
1949	15.364	12.144	11.90
1950	13.296	13.866	12.03
1951	17.500	18.000	13.32
1952	. 16.467	16.215	13.94
1953	13.489	10.855	14.56
January 1, 1954	. 13.500	10.000	14.62

 $^{^{\}circ}$ Market price plus premiums. † Rates for Coeur d'Alene district are believed to be representative for most U. S. lead-zinc

referred back to the Committee to await the report of the Randall Commission. It was never voted upon on its merits. However, testimony was so undisputed about the conditions in lead and zinc that in the closing hours of Congress a rather unprecedented resolution was passed by the Senate Finance Committee and House Ways and Means Committee. This resolution directed the U.S. Tariff Commission to schedule hearings on lead and zinc and to report back to these Congressional committees by March 31, 1954. The Tariff Commission announced the hearings would be held beginning November 3 under Section 332 of the Reciprocal Trade Agreement Act. Section 332 is for a broad and general investigation. In September the National Lead-Zinc Committee petitioned the Commission for "escape clause relief" as defined in Section 7 of the Act. Thus, the recent Tariff hearings were conducted as concurrent investigations under these two Sections (332 and 7) of the Reciprocal Trade Agreement Act. The Commission's findings under Section 332 will be made in its report to the appropriate Senate and House Committees by March 31. Their findings and recommendations under Section 7 will be made to the President not later than June 30. Under Section 7, the Commission has the power to recommend a 50 percent increase in tariff "existing on January 1, 1945," and/or recommend import quotas. If the Commission recommends the full tariff increase, duty on slab zinc would advance from 0.70 cent to 2.10 cents and on pig lead from 11/16 cents to 2.55 cents. In round figures, the Commission can propose about a 3-cent increased duty for both metals combined. All witnesses at the hearing agreed that if this were to be approved, the American market price would increase something slightly less than 3 cents in combined price. Any increase in price, however modest, is a step in the right direction but 3 cents is obviously not enough to solve the There seems little doubt problem. then that, even if the "escape clause" provision to increase duty are used to the fullest extent, the lead-zinc mining inquiry may again be seeking the "anti-dumping" or "sliding scale tariff" in the next Congress.

Not to be overlooked, as the domestic industry considers its own particular problem, is the effect the Randall Commission report to Congress will have concerning the general subject of world trade. Of even more importance to mining is the President's recently appointed "Cabinet Commission"—consisting of McKay, Dulles, Weeks and Flemming—who are directed to come forward by March 31 with a "national policy on minerals and metals."

The climax of hearings in 1953 oc-

curred in early November. These hearings before the U. S. Tariff Commission saw a unified domestic mining and smelting industry supporting a position for duty increases with a barrage of facts and figures perhaps heretofore never compiled in one place.

If such comprehensive figures have ever been gathered together before, their existence is unknown. For example, the Commission was presented with statistics from two very different mining districts; the Metaline in northeastern Washington and Coeur d'Alene in northern Idaho. Using the figures for the year 1952 as representing the most recent normal operating year, the total average cost was 15 cents to produce a pound of refined metal for 18 mines in these districts. To this total cost of 15 cents per lb must be added at least 1 cent margin of profit for the miner, needed for capital expenditures in plant and equipment capitalized exploration and development projects, and returns to shareholders. Forgetting for the moment the 1953 increases in wages and supplies, this compilation for these mines provides a wealth of data to support the industry's contention that a combined price of 32 cents to 33 cents is needed to sustain a profitable and continuing lead-zinc industry in the United States.

Industry Has Tried Self Help

The Tariff Commission was shown what the industry has done to try to help themselves.

(1) Curtailment, lay-offs, mine closures, smelter shutdowns, and reduced workweeks have occurred. These seriously affect the economic well-being of the communities which are sustained by the local lead and zinc industry.

(2) The districts have tried to reduce costs by curtailing exploration and development—a sorry choice in an industry which must constantly "plough back" profit dollars to block

out a ton of ore reserves for each ton

(3) By mining higher grade ore, mine operators have attempted to maintain profitable operations. This has been to no avail, as losses still continue. In addition, it is not good mining practice to "high-grade" an orebody and lose mineral which should be mined if prices were reasonable and normal.

(4) Underground mechanization, requiring large capital expenditures, has been a major factor in keeping unit costs from increasing proportionately as miners' wage rates have increased to 172 percent of their 1946 level; or from \$8.50 per shift in 1946 to \$14.62 in 1953 (not including "fringes" of about \$4 per shift).

The mines and smelters have tried to cut their costs. This has been done despite the fact that the decisions forced upon them were not wise and prudent ones for the continuation of a healthy domestic lead-zinc industry.

At one time the National Lead-Zinc Committee included in their petition for "escape clause relief" not only an increase in tariff, but also the establishment of quotas. The Tariff Commission has the power to recommend both of these. Subsequently, however, the request for quotas was withdrawn because both the American mining and the American smelting industry could see no fair and equitable manner in which import quotas could be applied, both with respect to allocation to foreign producers as well as allocation for distribution to American smelters. The representatives from smelters, who joined with miners in the request for tariff relief, proved conclusively that the American market price for lead and zinc is determined by imports of metals and not by imports of concentrates. It appears certain that the problem of quotas on metals needs further study by experts in the field of supplying lead and zinc to domestic consumers.



Employment in lead-zinc mines continued downward



Lead production was the lowest since 1946, and zinc output the lowest since 1933

Seek Control of Imports

It also appears that consideration should be given to a tariff schedule providing a greater differential between tariff on concentrates and tariff on metal. Opposition witnesses agreed that something must be done and done quickly. The main argument before the Commission involved the proper method of correction. American producers were asking for immediate "escape clause relief" with the admission that this is insufficient. The only other thing the Tariff Commission is empowered to recommend is quotas. The opposition maintained that the problem should be solved by subsidies. Every time the question of subsidies was put to the American producers' witnesses they all answered with a flat "No!" They pointed out that no one could change the fact that American market prices had been driven down so low due only to one thingun-needed imports of slab zinc and pig lead.

Not the Answer

Subsidies will do nothing concerning excessive imports and, therefore, beg the question. For those who abhor subsidies, it was heartening to see the unanimity of domestic witnesses in opposition to subsidies, when it is remembered that many mining districts are in a desperate position. New Mexico, for example, had been producing zinc at the rate of 50,000 tons per year for the last 10 years, but today not a pound of zinc is being produced.

Nears Production Low

Preliminary reports indicate that 1953 domestic mine production will be about 347,000 tons of lead and 536,000 tons of zinc. This is the lowest production of lead since 1946 and lowest for zinc since 1938. In contrast, imports continued to break all records. By October zinc imports amounting to 645,000 tons had already exceeded the previous record years of 1943 and

1952. Also, by October, lead imports (495,000 tons) indicate the prior record for 1952 will be exceeded. Unless the figures for total imports are examined more closely, however, the effect of imports of refined metal on the U. S. price is unnoticed. Zinc metal imports for the first ten months of 1953 amounted to 215,815 tons, against only 78,158 a year ago-or an increase of 176 percent. Lead metal imports for the same period in 1953 were 353,-986 tons as contrasted to 388,939 in the ten months of 1952. In the closing months of 1953, Mexican and Canadian pig lead went abroad. Therefore, for the moment the U.S. supplydemand status for lead, although improvement is needed, was much better than zinc.

With domestic peace-time consumption at a record high it is certainly a paradox that the price is so low. Imports during 1952 and 1953 exceeded

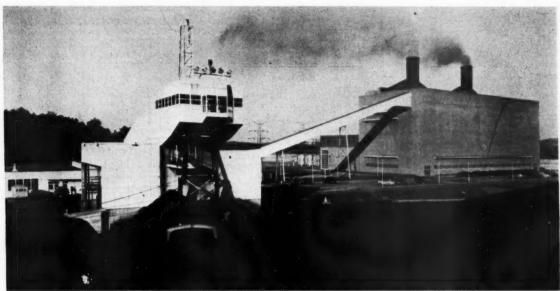
anything of record. Approximately two tons of metal have been imported for every ton of imports that the U.S. consumer actually needed. In the case of zinc, it appeared very certain at the time of the Tariff Commission hearings, that with 300,000 tons of recoverable zinc as United States stocks in the hands of both producers and users. little, if any, improvement in the zinc price can be expected for some time to come. At the close of 1953 the supply-demand picture for lead appears to be somewhat better balanced, but this could be quickly changed if Mexican and Canadian pig lead returned to the U.S. markets.

Mining employment, which averaged 21,000 in 1947, sank to 14,000 in 1953 and is still dropping. The slump in employment, profits, and production came in a year when U.S. consumers are using zinc at a record rate (1 .-100,000 tons) and using lead at a rate only slightly below the 1950 peak (1,200,000 tons). Unneeded imports have driven the price so low that major segments of U.S. industry can only operate at a loss or close down. No bright spots appear on the horizon as 1953 closed, except for some reduction in imports. With understandable anxiety and trepidation the leadzinc mining and smelting industry awaits the date of March 31, 1954, when the U.S. Tariff Commission and the Cabinet Commission simultaneously will be making reports which will determine, to a large extent, the fate of domestic operations.

It is indeed to be hoped that the U. S. Tariff Commission's report to the President on "escape clause relief" be submitted at a very early date in 1954, and in any event not later than March 31.



Many companies pushed exploration and development work, a though on a reduced scale



Coal stocks stood at 82,000,000 tons at year's end with over half in electric utility stockpiles

Bituminous Coal Industry

Faced by a Changing Use-Pattern and Rising Operating Costs, Industry Challenges the Future

By WM. A. FULLARTON
Assistant to the President
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FOR the bituminous coal industry, 1953 was a trying year, not unlike many others. Tonnage for the year was about 3½ percent below that for 1952 which in turn was about 12½ percent below the 1951 figure. The estimated production of 452,000,000 tons was somewhat higher than some industry leaders predicted at the beginning of the year, however. It might be said that in this respect the industry held its own.

Important losses in demand continued to show up in the railroad fuel and retail dealer categories. Railroads have continued the trend away from coal by adding large numbers of diesel-electric locomotives to their already large fleets of that type of motive power, cutting another 10,000,-000 tons from their 1952 coal requirements. Oil and gas, especially the latter, took over 9,000,000 tons of the retail dealer market from bituminous coal, thereby reducing the producers' markets for higher-realization products. A reduction of about 13,300,000 tons in foreign trade (exports to Canada and overseas) completes the darker side of the 1953 production picture.

Bright spots in the demand for coal are in the electric utility and the steel industries. Both of these industries have expanded their productive capacities and they burned 9,000,000 and 13,800,000 tons, respectively, more in 1953 than in the previous year. Cement mill and general industrial demands increased only slightly. A net increase in coal stocks at the end of the year of 5,500,000 tons rounds out the brighter side of the picture.

During 1953 the industry generally incurred higher costs with little, if any, increase in realization. The industry was forced to absorb most of the October 1952 labor rate and welfare fund rate increases. Importation of low-priced foreign residual oil to the East Coast continued to give trouble to coal. There appears to be no relief in sight unless the Congress limits importation of foreign residual oil under a quota system.

Insofar as labor relations and transportation matters are concerned, 1953 was relatively uneventful. The labor

contract was allowed to run through the year without being disturbed. There were no industry-wide strikes or disputes. Although the railroads gained an extension of the Ex Farte 175 increases to December 31, 1955. the only coal freight rate increases that went into effect during the year were a few intra-state rate increases. On the other hand, some of the railroads apparently have begun to doubt the wisdom of the general 12 percent increase in coal freight rates which went into effect in 1951 and 1952, and have proposed a few selected reductions. One of these has gone into effect and two others are under suspension and investigation.

Another cause of uncertainty and confusion was and continues to be the question of the generation of electric power using nuclear energy.

Many Mines Closed

Conditions resulting from the foregoing problems have caused the temporary or permanent abandonment of many high-cost and marginal coal mines. The same problems have led other producing companies-those possessing physical and financial resources and blessed with capable managers, men of vision-to mechanize productive facilities and install modern preparation facilities in order to meet the severe challenges of competition from within the industry and from other fuels. All in all, these re-curring "trials by fire" serve to strengthen the basic structure of the industry, preparing it to furnish all civilian and military coal requirements of this country and its allies, as it has so ably done in the past.

Bituminous coal and lignite production in 1953 went along on rather an even keel, registering between 8,000,000 to 10,000,000 tons per week, except in those weeks affected by holidays or the annual vacation period. In mining an estimated 452,000,000 tons, the industry's output was 178,000,000, or 28 percent, below the 1947 peak, and 15,000,000 tons, 3 percent, above the 1949 total, which was the year of lowest production since 1939.

Production of Bituminous Coal and Lignite in the United States and Alaska for Selected Periods

Periods Net Tons (Thousands																			
1935-	39)	1	1	V	eı	12	11	26										400,078
1947																			630,624
1949																			437.868
1951																			533,665
1952							Ĺ	i	i	i	ì		i	Ĺ		i	i		466,841
1953)													452,000

The record of the industry in meeting widely varying demands in the face of discouraging odds attests to its basic strength and virility. All producing districts have not fared equally well, of course, but no consumer of coal has had to go begging for his supply during the last several years.

Consumption Pattern Changing

The pattern of distribution and consumption continued to change in 1953. Losses in railroad fuel and retail dealer demands were not entirely compensated for by increases in consumption by the electric utility and steel industries. An accompanying table

CONSUMPTION AND STOCKS, BITUMINOUS COAL AND LIGNITE, FOR SELECTED YEARS (In Millions of Net Tons)

	1939	1947	1949	1951	1952	1953 (Est.)
Electric Utilities	42.3	86.0	80.6	101.9	103.3	112.0
By-Product Coke Ovens	61.2	94.3	85.9	102.0	90.7	104.0
Beehive Coke Ovens	2.3	10.5	5.4	11.4	6.9	8.1
Steel and Rolling Mills	9.8	10.0	7.4	8.0	6.8	6.1
Cement Mills	5.3	7.9	8.0	8.5	8.1	8.2
Other Industrials	103.1	126.9	99.0	105.7	95.9	96.8
Railroads (Class I)	79.1	109.3	68.1	54.0	38.0	27.5
Retail Deliveries	71.5	99.2	90.3	76.5	68.4	60.0
Bunker	374.6 1.5	544.1 1.7	444.7	468.0	418.1	422.7
Exports (Canada and Overseas)	11.6	68.7	27.8	56.7	47.6	34.3
Total Indicated Demand	387.7	614.5	473.4	525.6	466.4	457.6
January 1	40.7	47.2	69.4	72.5	76.6	76.7
December 31	44.6	52.2	45.1	76.6	76.7	82.0
Net Changes	+3.9	+5.0	-24.3	+4.1	+.1	+5.3

Source-Federal Power Commission.

SUMMATION OF INSTALLED CAPACITY AS OF JUNE 30, 1953 WITH SCHEDULED ADDITIONS

Class I Systems (Kilowatts)

		Installed Capacity	Scheduled Net Additions to Installed Capacity*				
	Region	June 30, 1953	July-Dec. 1953	Year 1954	Year 1955	Year 1956	
I	Northeast	19.951.863	1,215,000	1.730.625	960.250	836,900	
II	East Central	14,362,793	1,755,420	1,754,000	2,246,650	838,000	
III	Southeast	13,286,713	1,819,130	3,212,970	2,369,730	364,000	
IV	North Central	10,482,650	1,450,750	1,054,000	893,000	160,000	
V	South Central	7,622,321	522,000	1,618,044	1.038,000	554,255	
VI	West Central	1,703,227	222,450	242,500	416,000	120,000	
VII	Northwest	6,071,690	771,900	637,400	752,200	586,000	
VIII	Southwest	7,977,365	512,750	1,229,000	855,500	40,000	
U.	S. Total	81,458,622	8,269,400	11,478,539	9,531,330	3,499,155	

* Additional capacity being considered for installation by the reporting systems by December 31, 1956—although not definitely scheduled—totaled some 4,084,770 kilowatts. Source—Federal Power Commission.

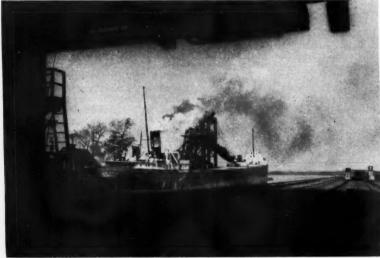
shows bituminous coal and lignite consumption and stocks for selected years to indicate recent trends. All figures, except for 1953, are revised Bureau

of Mines figures; 1953 figures contain estimates.

The electric utility segment of the bituminous coal market continues to expand rapidly, assuring the industry of greater demands in years to come, although there is some evidence currently to indicate that the rate of expansion may be tapering off slightly, at least temporarily.

With the expansion of the industry more modern and efficient burning equipment is being put to work, resulting in greater fuel economies. Equipment capable of burning low grade coals efficiently has affected adversely some higher-priced, high grade coals. Fuel economy has improved from 3.2 lb of coal to generate one kwh in 1919 to 1.10 in 1952. Federal Power Commission figures for all coal (including anthracite) show this trend.

It is likely that this trend will continue. In fact, it is said that some units have attained an efficiency of 0.75 lb per kwh. This is all the more important for coal in the future in nuclear energy becomes a serious threat in the generation of electricity.



Exports dropped an estimated 13,300,000 tons

										Pounds of Coal Per KWH	C	nomy Gair over 1919 Percent)
1919										3.20		
1929										1.66		48.1
1939			ĺ.							1.38		56.9
1947		i	i	ĺ						1.31		59.1
1949	-				ì					1.24		61.2
1951		Ĺ	ì				Ī			1.14		64.4
1952										1.10		65.6
					S	01	aı	cc	e	-Federal	Power	Commission

Atom Energy Not Threat Now

Out of all the confusing statements about the feasibility and economics of atomic-powered electric generating plants, considered opinion seems to indicate that it will be a great many years before coal's market in this field will be seriously threatened. Areas far removed from economical sources of coal probably will find atomic energy economical before areas closer to the coal fields. Current estimates of the cost of constructing these plants indicate that they could not compete with coal-fired plants.

Electric utilities customarily carry larger stocks of coal than any other consuming class. Presently they amount to about 50 percent of total stocks of all industries. As generating capacity goes up and the demand for coal increases, the amount needed for storage also goes up, which raises the average day's supply on hand for all classes of consumers. The accompanying chart shows electric utility stocks on hand through October 1953.

Coke-Iron and Steel Grow

These allied industries also have expanded capacity during the last few years. Consumption figures show that by-product and beehive coke ovens plus steel and rolling mills consume



The industry has absorbed the last three miner's wage increases

more coal than the electric utility industry. The latter will overtake and pass the former in a few years, however, because expansion of the steel industry will not keep pace with that of the electric utility industry.

Weekly production of ingots has declined considerably in the past few months but it is expected to pick up somewhat in the near future. The iron and steel industry has announced a new statistical index of ingot production based on the average annual production of the three postwar years, 1947 to 1949, inclusive, as 100 percent. The average annual production in that period was 83,837,572 net tons of ingots and future production statistics will be based on that figure. This, with the higher productive capacity of the industry, will result in a more realistic index by which to measure industry production.

Steel demand, and consequently that industry's coal requirements, will de-

pend to a great extent on the level of civilian and defense spending. It is expected that coal demands will remain strong although there may be some temporary declines.

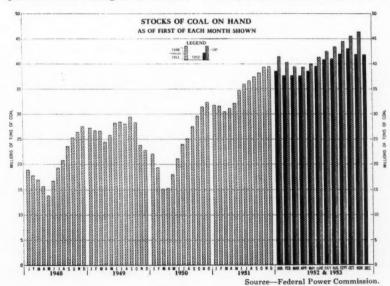
Less Railroad Fuel Used

The railroads' demands on coal to fuel their locomotives continued to decline sharply in 1953. This has resulted from the actions of the country's large railroads in replacing coalburning steam locomotives with new diesel-electric locomotives. The Interstate Commerce Commission reports that in the first 11 months of 1953, 1990 new locomotives were delivered to the railroads-of these, 1972 were diesel-electric, 14 were steam and four were gas turbine-electric. During the year another railroad which depends upon coal as its principal source of traffic revenue announced that it was ordering 25 diesels to replace old coalburning steam units. This trend continued with other railroads which depend on coal-hauling for an important source of revenue.

Efforts to develop an efficient coalburning gas turbine electric-drive locomotive to compete with dieselelectrics are continuing but progress is slow. Every day of delay in the accomplishment of this result will make it that much more difficult to make inroads on the diesel's domain.

Develop Domestic Stoker

With the gas industry claiming the addition of 800,000 new customers in 1953, and with added competition from oil for household heating, the retail dealer segment of the coal industry faced a decline of over 8,000,000 tons of bituminous coal in 1953. Deliveries of this fuel by retailers will probably amount to around 60,000,000 tons compared to almost 100,000,000 in 1947. The mortality rate among dealers would have been higher if they had to depend only on coal, although a



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few strong retailers handle nothing else.

One of the most promising steps taken by the producing and retailing segments of the coal industry to retain present customers and to get a greater share of new customers is the cooperative effort toward developing an acceptable and satisfactory automatic coal-burning device. This project has gone so far as to form a corporation, with stock held by producers and retailers alike, to foster the development, manufacture and sale of a stoker with certain features not possessed by all of the stokers now being marketed. In the face of definitely rising prices for gas, and to a lesser extent for oil, it is all the more important that satisfactory coal-burning equipment should be developed for the home-heating market.

Cost Hikes Absorbed

No comprehensive statistics are available to show either costs or realization for the industry as a whole. It is apparent, however, that the rate increases agreed to by the United Mine Workers of America and the coal operators in October, 1952, resulted in substantial cost increases. Wage rates were increased by \$1.90 per day and payments to the welfare fund were raised 10 cents, bringing the total payments to \$18.25 per day and 40 cents per ton, respectively. Every rate and cost increase intensisifies the drive toward further mechanization, eliminating mines not adaptable to more efficent, cost - cutting

Labor	Contrac	t Incr	creases		
	*** **	900			

Year	F	Average O. B. Mine Prices	Wage Rate Increases	Welfare Fund Rate Increases	Effective Dates of Increases	
1950		\$4.84	\$0.70 daily	10c per ton	3/5/50	
1951		4.92	1.60 daily	None	2/1/51	
1952		4.90	1.90 daily	10c per ton	10/1/52	
1953		4.98 Est.	None	None		

mining methods and closing mines with coal of a quality that can't compete with higher grades.

The U.S. Bureau of Mines has estimated that the weighted average f.o.b. mine price of bituminous coal and lignite sold in 1953 is \$4.98. This would represent an increase of eight cents per ton from the 1952 price of \$4.90. If this estimate is correct, it doesn't cover the total increase in costs from the 1952 contract. Figures gathered by the Office of Price Stabilization, discontinued in February of 1952, showed that after a temporary increase in realization in October, 1952, the level of prices started to decline even though the months of greatest demand were at hand. Those figures also showed that the producing industry absorbed all of the cost increases resulting from the 1950 and 1951 contracts. In fact, the average price went down shortly after the February, 1951, contract went into effect.

The following table shows the weighted average of f.o.b. mine prices of bituminous coal and lignite, which contains values for captive coal, for the years 1950 to 1952, inclusive, with

the estimate by the Bureau of the 1953 price. Also shown are the wage and welfare fund increases which went into effect in those years.

Future a Challenge

The bituminous coal industry is in the midst of one of the most challenging periods of competition that it has seen for a good many years. comes out of this period with strength and soundness it will be a tribute to its leaders and its engineers. Only through increasing efficiency in the form of increasing tons mined . per man-day, cutting supply and other costs can the industry hope to survive. Since transportation costs also are an important part of delivered prices, an assist from the railroads in the form of lower freight rates would aid greatly in expanding the demand for coal. As noted above, the railroads have proposed several reductions and more may be in the offing. Certainly they would help the coal industry and the railroads, and serve to make stronger an industry which is vital to the welfare and defense of the coun-

Copper

(Continued from page 91)

32 cents, replacing old contract terminated automatically in February.

December—Signed agreement with Howe Sound Co., Washington, for 9350 tons at 31.5 cents. Supersedes early agreements at 29.8 and 32.54 cents, terminated in February.

The suspension of the two-cent-apound excise tax on copper imports was to terminate February 15, 1953, but it was extended to June 30, 1954. The law provided that the Tariff Commission inform the President within 15 days after the end of any month in which the price fell below 24 cents a lb and he was to revoke the suspension within 20 days thereafter.

World Output Level

World production was virtually the same in 1953 as in 1952. United States and Canadian outputs were close to the 925,000 and 258,000 tons, respectively, produced in 1952. Northern Rhodesian output probably rose 10 percent, that in Mexico seven percent and in Australia 67 percent, offsetting the drop of 15 percent in Chilean pro-

duction caused in part by six-week strikes at the Chuquicamata and Andes mines. Northern Rhodesian production in 1953 would have been even greater had it not been for the continuing problem of obtaining adequate supplies of coal.

Copper is used so extensively by the electrical, construction, automobile industries, and others that the level of consumption of this metal closely follows that of industry in general. Upand-down swings in copper, however, tend to be more precipitate than the average. Some observers look for a reduction of perhaps as much as five percent or somewhat more in the level of business in 1954 as compared with 1953. If these forecasters are correct, a copper consumption drop between 5 and 10 percent may be anticipated.

Copper prices, artificially strengthened by the withholding of a large segment of Chilean production from the market in 1953, doubtless will decline more than consumption in 1954. United States production may continue at current levels even if prices drop, because some marginal production is covered by Government floorprice contracts and because new production under other DMPA contracts

will at least counterbalance falling output at high-cost mines that do not have floor-price protection.

The excise tax will be reimposed if the price falls below 24 cents a lb for as much as a month and by July 1, under any circumstances, unless the tax suspension is continued thereafter by Congress. For the longer future, however, consumption of copper is expected to resume the general upward movement in progress for many years. Increased demand resulting larger population and generally higher standards of living will more than offset inroads of aluminum and other substitutes. Prices for copper, as for other commodities, will doubtless follow a general upward course in the years ahead.



Silver and Gold in 1953

Amount of Silver Coined Exceeded Domestic Mine
Production. Schedule Hearings on Gold
Convertibility

By PAT McCARRAN United States Senator from Nevada



SILVER—The end of 1953 marks the twentieth year of operation of the Silver Purchase Act of 1934. This Act is one of the most significant events in the silver world—domestically and internationally—since the free coinage of silver ended in 1873. Briefly, here is what twenty years under the Act have meant:

(1) The acquisition of 2,045,200,000 oz of foreign silver during the first nine years of the life of the Act, thereby increasing silver dollars and silver certificates in circulation by \$1,025,500,000.

(2) A definite plan for the rehabilitation of the precious metal in our monetary system, imparting soundness to that system.

(3) A perpetual vehicle for the acquisition of foreign silver to satisfy monetary demand in the United States.

(4) A stimulation to world production of copper, lead and zinc, of which 80 percent of newly-mined silver is a by-product.

(5) Provision of substantial stocks before and during World War II, serving a monetary and industrial "stockpile" function for use in both war and peace.

The Act has not been used to the fullest extent intended. It is common knowledge that the Treasury Department stopped purchasing silver on the open market in 1942, without having compiled with either of the two principal provisions of the Act, (1) that silver acquisitions should be continued until our silver stocks equal 25 percent of the total value of the gold and silver stocks or (2) until the market price of silver reaches \$1.29 an ounce. Since 1942 the Treasury has been offering to buy foreign silver at only 35 cents an ounce, which is a gross violation of the spirit of the Act. This administrative circumvention of legal requirements has led the Treasury Department into what may become a serious dilemma. At the end of 1953 silver in the Treasury's seigniorage fund,

which is the profit silver arising from purchases at less than the monetary value of \$1.29 an ounce, and used primarily for the minting of subsidiary coinage, declined to the lowest amount in 20 years. These reserves have dwindled continuously since 1943 because the seigniorage from domestic purchases during the succeeding years has not been enough to satisfy the increased demand for coinage. Last year 42,731,714 oz were consumed in new United States subsidiary coins while only 10,020,308 oz were added to seigniorage. Also during 1953 the industrial consumption of silver reached approximately 105,-000,000 oz, only 599 oz of which were purchased from the United States Treasury at 91 cents an ounce.

At the prevailing rate at which the seigniorage fund is dwindling it is obvious that a new low danger point will be reached during 1954, unless the Treasury resumes the purchase of silver under the Silver Purchase Act of 1934

If this seigniorage fund reaches a point near depletion, where will the Treasury get silver for coinage? There are four alternatives:

(1) Resume open market purchases as provided under the Act of 1934.

(2) Raise the price of domestic silver. This may take time but such a move would stimulate silver production and, depending on the price agreed upon, eventually add enough to bridge the gap between present additions to seigniorage and withdrawals for coinage.

(3) Retire some silver certificates and melt down the "freed" silver backing them. This would be comparable to the "Crime of 1873" and I would vigorously oppose such a move.

(4) Use returned World War II lend-lease silver. Actually, only 261,333 oz had been returned by the end of 1953. Since return of most of this silver is not due until 1957 it will likely not come in time

to meet the Treasury's problem at the current rate of reduction of seigniorage silver unless the beneficiary countries can be induced to pay their lend-lease debts in advance of their due dates.

Apparently the only avenue open to rapid accumulation of stocks for coinage is through world market purchases. I propose that the Treasury immediately consider the use of statutory authority under the Act of 1934 and commence such purchases before the end of 1954.

Lend-Lease Silver

Most of this silver (totalling 410 .-553,011 oz) is not due to be returned until 1957. Many obligated countries have commenced programs of taking silver out of circulation as coins ostensibly to acquire stocks from which to repay their silver debts. Britain and India have already substituted cupro-nickel for silver coins. Assuming these countries must do this to acquire sufficient stocks for liquidation of their lend-lease accounts-a tenuous assumption for my part-it might be better to allow them to retain this silver provided they agree to continue to coin the metal and circulate it as an integral part of their monetary systems.

We should not permit lend-lease to be the vehicle for denuding other currency systems of the stability and confidence which silver imparts. Monetary use of silver should be encouraged; such usage is silver's forte the basis for its prestige. should review our lend-lease policy and explore the possibilities of an agreement which would permit the major part of the volume involved to remain permanently in debtor countries for use as money. Such countries could satisfy their debts to us in other ways-such as the setting up of emergency funds in native currencies for our use in the purchase of certain strategic materials unavailable in the United States in times of extremely short supply.

Mexicans Influence Market

Price stability prevailed in the New York market in 1953, as in the past several years, the dominating feature being the Mexican policy of buying silver when supplies are redundant and selling when demand is firm. The price of 85½ cents an oz was current throughout the year except from January 1 to 15, when it varied from 83½ cents to 85½ cents.

How long can our Mexican friends continue their important role of preventing the market from being swamped? Fortunately, no abatement of their activity is in sight. But it should be pointed out that Mexican production today is about 35 percent below pre-war, 1953 output being estimated at 45,000,000 oz. Mexico continues as the world's largest producer and supplied the United States with 25 percent of its total ore and base bullion imports in 1953.

Industrial Demand and World Production

Consumption of silver for industrial uses last year reached 105,000,000 oz. In recent years new and increased uses have been found in the chemical and electrical fields, bearings, brazing alloys, electrical contacts, dental and surgical supplies, in addition to principal usage in sterling and plated ware and in the manufacture of nitrate for photographic film.

Industrial consumption in the United States today is about three times the pre-war level. The greatest increase has been in those categories other than sterling and plated ware and nitrate, from a level of 2,300,000 oz in 1938 to over 20,000,000 oz in 1953.

World production excluding United States output of 38,667,000 oz, most of which went to the Treasury, is estimated at 167,000,000 oz for 1953, of which the net industrial consumption in the United States alone is roughly 63 percent. World industrial consumption plus world coinage exceeded world production by over 35,000,000 oz. This trend has been evident for some time, particularly since World War II. If it continues, to meet the increased demand new deposits must be found or there will be a substantial increase in the world price.

Coinage and Circulation

Coinage of half dollars, quarters and dimes last year consumed 42,731,-714 oz of silver. Subsidiary silver in circulation increased \$38,000,000 during the year. No silver dollars were minted, although their circulation reached \$209,600,000 on December 31, a new record. Silver certificates outside the Treasury rose from \$2.371 billion at the end of 1952 to \$2.396 billion on December 31 of last year, an increase of \$25,000,000.

Subsidiary silver coined plus withdrawals for industrial uses reduced the Treasury's "free" silver by 28,-648,167 oz in 1953, leaving only 49,-647,562 oz of "free" silver in the General Fund on December 31. At the present rate of depletion this reserve will be exhausted in about sixteen months.

United States mints coined silver for Cuba and the Dominican Republic in the amount of 5,281,800 oz during 1953. This silver was furnished by these foreign governments.

Silver Movements

Imports of silver (ore, base and refined bullion) totaled 102,000,000 oz in 1953, an increase of 26,000,000 oz irom 1952. Imports have ranged from 75,000,000 to 112,000,000 oz since 1946 with the exception of 1950 when imports rocketed to 145,000,000 oz. Exports have been negligible since 1947, totaling only 6,000,000 oz last year.

A major source of silver for industry in recent years has been Cuba, which in 1950 demonetized 50,000,000 oz in one-peso coins and exported them to New York. The last ounce was marketed toward the close of the year. Since 1950 these coins have represented about 20 percent of our annual imports. Consumers may face a tighter market early in 1954 if imports do not increase from other sources.

Russia shipped about 15,000,000 oz of silver to London last fall for the first time since World War II. Reportedly the Soviets were short on sterling and the British needed the metal for industrial use and for the fund they are allegedly accumulating for lend-lease settlement. British restrictions on purchases of silver for industrial use from any source were lifted in December. Previously the Bank of England parceled out silver from official stocks. The move may result in a rise in the New York price as British dealers enter the market.

Outlook for 1954

Of major concern to both silver producers and consumers in 1954 is the state of our economy. Economists have variously forecast either a "recession" or an "adjustment" from recent high levels of business activity. If there develops a falling off in demand for the base metals there will be a lower output of by-product silver from domestic mines. For industrial consumers a slight reduction in overall demand may seriously affect the demand for silver products, since these are largely in the luxury class. However, the continued growth of our population and the sustained high level of marriages should aid in avoiding any alarming decline in demand for silver products.



Gold output in the U.S. was greater than in 1952 but about 15 percent under that in 1950



U. S. silver coinage exceeded domestic production of the precious metal

Silver Legislation

Our silver statutes constantly face threats of repeal. In 1953 Senators from silver-using areas spearheaded a drive to repeal the Silver Purchase Act of 1934 and subsequent Acts by the introduction of S. 2555. This bill did not receive a hearing last session. Nevertheless, domestic miners must be aware of the seriousness of the threat. And there is one thing I want to caution on: We should stand on the Silver Purchase Act of 1934 as passed and, indeed, insist that the Treasury live up to its provisions and resume purchases under this authority until one of the Act's objectives is reached. No new legislation is required for the market price of silver to reach \$1.29 This is the monetary price of silver established in 1792 and the market price should be raised to that level so that the market value of the silver in the silver dollar (371¼ grains) will equal one dollar in the open market. When that happens there will again be an urgent demand for silver dollars. This objective must be reached.

GOLD-Gold, the barometer and fiber of international trade, experienced one of its more exciting years in 1953. For the United States a significant development was a reduction in our gold stocks by about \$1.156 billion. During the year stocks reached the lowest point since 1951 and by the end of 1953 stood at \$22,029,428,-036.92. Factors contributing to this outflow include a more favorable trade balance for many foreign nations and sales of gold to foreign governments. An outflow of such proportion to most any other country would precipitate a drastic tightening of credit, greatly restricted imports and possibly cause a serious deflation. In the United States-economic giant that we arethis movement, although of potential concern, caused hardly a ripple in the

stream of our everyday life. Some tightening of bank credit may have occurred early in 1953 but prices went on to reach our highest level in history.

Several influences on the horizon for 1954 may cause a reversal of the gold outflow. Among these are: A lessening in American economic aid abroad, increasing exports, and lower imports. In addition, it does not seem likely that Congress will permit any substantial reduction in tariffs in this election year. This in itself should discourage additional imports.

Production Up

Domestic gold production last year totaled 1,935,638 oz, an increase of 42,477 oz over 1952. This compares with a production of 2,395,231 oz in 1950 or a drop of almost 15 percent in three years. During 1952 the Treasury acquired 1,400,863 oz of newly-mined domestic gold; figures for 1953 are not available at this writing.

The Union of South Africa continued to be the world's largest gold producer with a 1953 total of about 12,000,000 oz. A new gold strike has been reported in South Africa at Kinross about 100 miles from Johannesburg. Details are lacking on the extent of the new field but if indications are realized South Africa may be on the way to increasing its share of the world's output. It usually accounts for 40 percent of the total.

Canada continued as the second largest producer with approximately 4,500,000 oz last year. Indications are that the Parliament will consider extension of the Canadian Emergency Gold Mining Assistance Act for one year in the 1954 session. Under this statute miners have the option of selling on the free market or selling to the Mint at \$35 an oz plus a subsidy based on production and costs.

Free Gold Declines

A major event abroad last year was the drop in price of gold on most of the free markets to approximately the official Treasury price-\$35 an oz in late fall. This was the first time prices have been as low in the premium markets for 20 years. There appear to be various reasons for the decrease. First, demand for gold for hoarding outside the United States has dwindled since the Korean Armistice last summer, particularly in the Far East Another factor is the recent sales of Soviet gold to England and some Continental countries. Sales to London alone have been over \$70,-000,000 in the last two months of 1953. The theory behind these sales is that the Russians are using the currency purchased to finance the import of consumer goods. A depressing element also has been the reiteration of United States policy to "hold the line" on the official \$35 price. This was announced by the new Administration via Deputy to Secretary of the Treasury W. Randolph Burgess at a September meeting of International Monetary Fund.

Gold Legislation

Congressional hearings will probably be held in 1954 before the Senate Banking and Currency Committee on my bill (S. 13) to establish a free market for gold and on bills to permit gold redemption. I also introduced a bill in the last session (S. 2514) which would require gold and silver redemption at prices to be determined by Congress.

In 1948, 1949, 1951 and 1953 I also introduced bills to establish a free market for gold. Hearings were held on some of these and other bills but there has been no Congressional action.

The forthcoming hearings will consider my bill for gold convertibility and that of Senator Styles Bridges (R-NH) and perhaps others. The introduction of Senator Bridges' bill is in line with the 1952 Republican platform promise of a return to sound money and gold redemption. For my part there will be no let-up in my demand for consideration of sound legislation and the betterment of the economic welfare of our nation's gold miners. Passage of these measures will most certainly be followed by similar actions by the IMF.

American leadership is being tested on many fronts today. Let history not record that we failed to join the battle for monetary stability here and abroad. That our children and grand-children and those of less fortunate peoples overseas may fully control the purse strings of Government and not be burdened with the debts of our generation we should dedicate ourselves passionately to the cause of gold and silver convertibility and national solvency.



The Dorrance Breaker of Lehigh Valley Coal Co. was completely revamped during the year

Anthracite in 1953

Production Off 25 Percent as Industry Looks to Research for New Markets and Cheaper Mining Methods

By E. C. WEICHEL

Vice-President Hudson Coal Co.

DURING 1953 the commercial production of anthracite dipped slightly below 30,000,000 tons (estimated). This is about 10,000,000 net tons below 1952 production. Except those years when output was seriously curtailed by work stoppages, it is the lowest annual production since before the turn of the century.

During the past five years, winters in most of the anthracite-consuming territory have been considerably warmer than normal, and the winter of 1952-53 was even warmer than previous seasons. The 1953-54 season also continued warm through the fall. Unseasonable weather, coupled with inroads from oil and gas, the falling off in exports to overseas markets, and the decline in shipments to Canadian markets, are the major factors in the loss. In addition, the increase in imports of foreign residual oil to the Eastern Seaboard has had its effect on anthracite sales. It has already done untold damage and if the situation is not remedied will do almost irreparable damage to the entire domestic coal industry and to the economy of the nation. Should a war emergency arise, with its heavy demands for oil, the coal industry could not, at short notice, be revitalized to supply the fuel needs for both industrial and home use. A complete and comprehensive review of the whole subject by the Federal Government, the coal producing states, the coal industry and its workers is urgently needed.

In five years employment has dropped about one-third. Records for 1953 show 58,000 employes on January 1 and a total of only 49,700 in November. The number of days worked in 1952 was 207, whereas the number of days worked in 1953 is estimated (December) at 175.

Labor Relations Good

Management and employe relations, except in a few instances, continued quite stable during the year. On October 1 the Anthracite Board of Conciliation celebrated its Golden Anniversary with a dinner meeting at Lakewood Park, near Mahanoy City,

Pa., attended by over 1400 industry workers.

During the half century of its existence the Board has sent to the Umpire only 30 percent of over 10,000 cases which have been submitted to it. Decisions of the Board or Umpire are final and binding on both the Mine Workers and the Operators. No other industry in the United States, if not the whole world, handles its management-labor relation problems in such a satisfactory manner.

During 1953 the United Mine Workers, through their safety representatives, continued their cooperation with local mine officials in the Safety First Program, and thereby contributed much toward reducing accidents in the industry. In addition, top flight officials of the three districts are members of, and sit in on, various other advisory committees that help conceive policies in research to reduce costs through new ideas in mechanization, research, etc. They have also been active members of committees studying mine drainage and pumping problems which have beset the operators of late.

"Anthracite Week" was observed throughout the region during the week of November 16, sponsored by Civic, Industrial and Labor organizations. The latest anthracite-burning equipment was displayed in Scranton, Wilkes-Barre, Hazleton and Pottsville. Among the featured displays was a pneumatic system of ash removal called the "Vacuum Ashaway," exhibited by the Lehigh Valley Coal Co.

Mining Research Continues

Basic research projects were continued by the Anthracite Institute and the State of Pennsylvania, largely

through facilities of Pennsylvania State University (formerly Pennsylvania State College). Some projects considered and studied were better burning devices and improvement of present equipment for use of anthracite. Others were studies of its physical and chemical qualities and characteristics, with the purpose of widening its use in the chemical and metallurgical industries.

Research analysis of anthracite was continued at Penn State to discover rare and trace elements in anthracite, also their availability and quantity. Germanium is one of the principal elements on which considerable study has been made. Studies along the line of metallurgical uses of anthracite and other special uses are being continued, with emphasis on the use of fine sizes.

The Anthracite Institute Laboratory also continued checking new burning equipment, especially for domestic or home use. When equipment is found satisfactory it receives the stamp of approval of the Institute. Frequently improvements to equipment are suggested prior to its being placed on the market.

Operated by the U.S. Bureau of Mines the Federal Research Laboratory at Schuylkill Haven, continued technical studies on the use of equipment such as shearing machines, coal planers, design of a large diameter borehole drill, use of yielding steel props in connection with backfilling, etc. Experiments in induced caving were conducted at the Newkirk mine of the Philadelphia & Reading Coal & Iron Co. near Tamaqua, Pa., under the direction of the Bureau of Mines. This experiment was conducted in a 14-ft thick bed which consisted of a bottom bench of fairly hard coal six ft thick, and a top bench of softer coal eight ft thick. The coal is on a 70° pitch and extends 328 ft from the gangway to the surface. A rock gangway was driven about 15 ft beneath the coal bed. Four rock holes, on 30ft centers were driven at 35° from this gangway to the bottom of the Slant chutes were then driven

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Lehigh Navigation Coal Co. tested yielding steel ring supports in some heavy ground

both ways from the top of the holes at 35° along the bottom rock in the coal. The undercut was begun by blasting four holes drilled from the intersection of each pair of chutes and loading part of the broken coal. The remaining solid coal between rock holes was then drilled and blasted to the same height to complete the undercut in the 120-ft experimental section, Caving began by drawing off the broken coal. This experiment has shown that high production, low cost mining in steeply pitching anthracite beds is possible, with higher percentage of recovery and with less arduous labor and increased safety to the men. The excellent results achieved warrant further study of the method for application elsewhere.

Study Preparation

In addition to underground studies, the Federal Laboratory continued to study new ideas and methods in preparation. Due to the multiplicity of sizes, especially in the junior or fine sizes, a large variety of equipment is necessary to properly clean and size anthracite coal so that maximum commercial recovery may be realized.

Metallurgical uses for anthracite in cupolas, blast furnaces and mixtureblending to make by-product coke are also under study. Some of these may require partial re-design of equipment to enable anthracite to replace good coke, which is becoming scarce. Work is also being done on other possible commercial and industrial uses of anthracite.

Under the Federal Law authorizing the establishment of the Anthracite Research Laboratory, an advisory committee, consisting of six members, determine which research projects come within the scope of the Federal Laboratory, and which can more effectively be carried out by private agencies and companies to avoid duplication of effort. The Philadelphia & Reading Coal & Iron Co. recently reorganized its research department and is now doing considerable work on the utilization of large sizes of anthracite for metallurgical purposes. Other companies are conducting private research seeking new or special uses for anthracite, in addition to studying their own mining and preparation problems.

A new machine known as the "shovel conveyor" was developed by





Gien Alden tried the first continuous mining machine in anthracite . . . using shuttle cars for transportation

Walter Herold of Scranton, Pa., during 1953. The pilot unit will soon be put into test operation in the Loomis Colliery of the Glen Alden Coal Co. It makes the use of hand-shovels obsolete and speeds the shoveling of coal onto conveyor belts. Its principal use will be at the face of pillars and it is planned as a one man operation. The machine is used in conjunction with yielding steel props and a timbering crew installs and withdraws props as work progresses. It appears the local conditions, particularly the type of roof and bottom, will have a great influence on the maximum efficiency of the machine.

Try Yielding Steel Supports

To meet an unusual situation in a tunnel passing through 450 ft of coal on a heavy pitch, the Lehigh Navigation Coal Co. installed 75 sets of yielding steel ring supports known as the "Glockenprofil," manufactured by Bergbaustahl of Westphalia, Germany. These replaced timber in a section where the timber supports had to be replaced very frequently. A unit consists of four segments. overlap of each segment is one ft four in, and the finished diameter of a ring is 13 ft, spaced on two-ft centers. Channel spacers were used between the sets. Because of bad conditions the sets were closely lagged around the entire circumference with 40- and 60-lb old rail cut in three-ft sections. The object of the installation was to reasonably stabilize ground movement around this important haulage road and reduce timbering maintenance costs. Results are not yet conclusive but performance has been satisfactory to date.

In cooperation with the U. S. Bureau of Mines, Lehigh has successfully installed some concrete sets in their mines made of a light-weight aggregate known as "Lelite." The sets are designed to withstand pressures of 4800 to 9600 lb evenly distributed.

Glen Alden Coal Co., in cooperation with the U. S. Bureau of Mines, continued experiments with collapsible props at their Nottingham Colliery, with considerable success. This has been watched very closely by the company and the Bureau of Mines. When the experiment is completed in all probability the collapsible props will find a wider use.

First Continuous Miner

During 1953 the Glen Alden Coal Co. has had a Joy Continuous Miner in experimental operation at its Loomis Colliery. Results of coal cutting with the machine have been satisfactory. Two shuttle-cars are used, one for transportation and one for a surge bin. Rapid face advance, developed new problems in timbering

and transportation and these are un-

der study at the present time.

Hudson Coal Co., in cooperation with the Pennsylvania Department of Mines and the U. S. Bureau of Mines, experimented with the use of roof bolting to determine its adaptability to anthracite mining.

To date the company has installed approximately 10,000 bolts, covering an area of approximately 100,000 sq ft of roof. So far the results have been excellent and a request has now been made to the Secretary of Mines of the Commonwealth of Pennsylvania to permit the use of roof bolting in place of timber.

Strip Mine Third of Production

There were no large new strippings started during the year. However the stripping production continued at a normal pace in keeping with the market conditions.

No radical changes in stripping methods were reported during the year, but improved and larger equipment is put in operation when conditions justify. Contractors R. J. Bazley and the Central Pennsylvania Quarry, Stripping and Construction Co., purchased two large-diameter, Bucyrus-Erie drills for use on the property of the Jeddo-Highland Coal Co.

Estimated stripping production for 1953 will be close to 30 percent of the total commercial production.

Preparation Highlights

No large new breakers were built in 1953, but one major improvement in preparation was the re-vamping of Dorrance Breaker of the Lehigh Valley Coal Co. in Wilkes-Barre, Pa. The Rheolaveur system was replaced with a Wilmot, heavy-density system for the larger sizes, and with their hydrotators and classifier equipment

for fine coal. Very satisfactory results are being obtained as the result of the complete changeover. This also enabled the company to abandon its nearby Prospect Breaker as a preparation unit. The normal output of Dorrance is now 4500 tons, all sizes, per seven-hr shift.

At Dodson Breaker, the Lehigh Navigation Coal Co. has replaced the pea coal jigs with a hydrotator, thereby reducing maintenance costs and producing a better market product.

The industry continued enlarging its fine coal cleaning facilities to meet the demand for junior sizes with a high quality product. With this in mind, the following major fine coal plants had improvements and additions made to existing facilities.

At Woodward and Loomis Breakers, the Glen Alden Coal Co., installed Wilmot Hydrotators and Classifiers to prepare fine coal.

At Coaldale Breaker, the Lehigh Navigation Coal Co., through the use of launder screens, dressed with 4mesh stainless steel cloth, is scalping over-size material from the input to the fine coal plant. This oversize material is then returned to the main breaker. They have attached an automatic device to the lifting mechanism of the hydrotator rake, equipped with a series of electrically operated, reversible switches, thereby virtually eliminating overloads during surge periods, thus preventing shutdowns of the machine. A clarifier conditioner has been added to the Coaldale Froth Plant to remove oversize coal and coarse, high-ash particles, which permits smoother operation of the plant and reducing reagent consump-

(Continued on page 122)



Preliminary cleaning plant at Maffet Bank eliminates moving much worthless material to the fine coal cleaning plant



Alumina is reduced to aluminum in the potroom

Aluminum in 1953

With a New Production Record Set in 1953, Industry Plans to Produce More in 1954

By WALTER L. RICE

President Reynolds Mining Corp.

THE domestic aluminum industry produced 1,250,000 tons of primary aluminum during 1953, establishing a new record and representing a 33 percent increase over the 1952 output of 937,331 tons, which also set a record. This sharp jump in output is the result of the large-scale expansion of domestic productive capacity which was undertaken after the Korean War started.

In 1950, primary aluminum production in the United States totaled 718,500 tons, with all producing facilities operating at capacity. During the past three years the domestic aluminum producers have invested close to \$800,000,000 in new facilities, most of it to increase its aluminum productive capacity. As a consequence of this intensive expansion program in 1953, the domestic industry achieved a 74 percent increase in primary production during 1953, as compared with the capacity output of 1950.

To keep pace with the expanded aluminum production, the supply of bauxite had to be correspondingly increased. Domestic mine output, over 95 percent of it coming from Arkansas, dropped off during 1953, totaling about 1,570,000 tons compared with a mine production of 1,667,000 tons during 1952. Imports were 900,000 tons, or 26 percent higher in 1953, totaling 4,400,000 tons as against 3,500,000 tons in 1952.

Since the end of World War II, the aluminum industry has turned increasingly to foreign ore. In 1947, about 61 percent of the bauxite used here was imported. The proportion rose to 65 percent by 1950 and in 1953 it was 72 percent. Surinam, with ore shipments of 3,000,000 tons a year, supplies about 70 percent of foreign bauxite. Jamaica ranks next with over 1,000,000 tons shipped during 1953. Other foreign sources during 1953 were British Guiana and Greece.

Bauxite Reserves Increase

World aluminum production also rose substantially during 1953, although over 70 percent of the increase took place in the United States. Estimated world output in 1953 was 2,738,000 tons, 19 percent above the 1952 production of 2,299,000 tons. The United States provided 46 percent of the world's output during 1953, three times as much as the production reported for the Iron Curtain countries. The total free world production of 2,332,000 tons was six times as large as that of Russia and its satellites.

Despite the world-wide increase in aluminum production during 1953, the ore reserves position of the industry seems to be very favorable. World bauxite reserve estimates, aggregating 2.4 billion tons, are about one billion tons higher than they were at the start of World War II. During this same period, since 1939, world mine production of bauxite totaled about 115,000,000 tons. Matching the mine output with the increase in reserves, it becomes apparent that for every ton of bauxite mined, about 10 tons of new reserves had been found.

The known bauxite reserves are divided among 32 different countries and mining operations are being conducted in 18 of them. About two-thirds of the world's reserves of 2.4 billion tons are in free world areas; the remaining third is behind the Iron Curtain. Most of the Russian-controlled reserves are in Hungary and China.

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Aluminum Imports Up Too

Primary and fabricated aluminum imports were larger during 1953 than in previous years. Government estimates of primary aluminum imports placed the 1953 total at 290,000 tons, which is 162,000 tons higher than the 1952 total. This increase in imports developed primarily because European markets were relatively weak during the year. Nevertheless the supply available to these markets had increased as a result of a seven percent increase in production by the Canadian and Western European producers.

Western Europe in particular became more prominent as an exporter to the United States market during 1953. Although Canada continued to be the principal source of foreign aluminum ingot, almost 25 percent of the 1953 imports came from Western Germany, Austria, Norway and France. In 1952 these European countries supplied only four percent of the ingot imports and in 1950 they supplied five percent.

Another source of supply, secondary aluminum recovered from scrap, also was reported to have increased during 1953. According to the estimates of the Aluminum Smelters Research Institute, 1953 production of secondary aluminum amounted to 250,000 tons, 12 percent more than in 1952. This represents a new record, the previous peak for secondary output having been the 1950 production of 239,000 tons.

The total 1953 supply, from domestic and foreign sources, made available in the United States during 1953 consisted of:

	housands of Tons
Domestic Primary Production Primary Imports	
Total Primary	1,540
Secondary Production (Recovered from Scrap)	250
Total Supply	1,790

During previous years the total supply on a comparable basis was 1,287,000 tons in 1952 and 1,134,000 tons in 1950. Consequently, the supply has increased about 40 percent since 1952, and almost 60 percent since 1950.

Aluminum Decontrolled

The increased supply available during 1953 made it possible for the aluminum industry to step up its shipments. Over 1,750,000 tons of aluminum products were shipped by the industry during the year, 34 percent more than in 1952. Civilian industry received more aluminum than ever before, even though defense shipments continued to be high.

With enough aluminum being shipped to meet all requirements during 1953, the Government discontinued its controls and restrictions on civilian use. The CMP system, used during World War II and put back into force after the Korean War started, was discontinued on July 1, 1953. In its place the Defense Materials System was brought into being. It provides "set asides" of aluminum for military and atomic energy orders but does not place any restrictions on the use of the remaining supply for civilian purposes.

As in previous years, the shipments of semifabricated aluminum continue to reflect a trend towards the greater use of extruded and rod and wire products. These groups of aluminum products have shown more pronounced growth than other categories. Since 1947, extruded products shipments have increased 284 percent, rod and wire products 192 percent but sheet only 33 percent. Back in 1947 com-

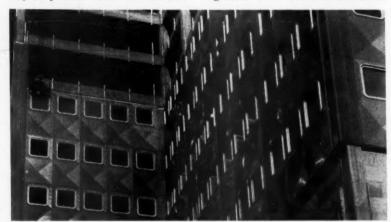
bined shipments of extruded and rod and wire products were only one-fourth as large as sheet shipments. Since then sheet shipments increased 148,000 tons but these other two groups increased their shipments by 265,000 tons. As a result, in 1953 shipments of these products were about 64 percent as large as sheet shipments.

Domestic Market Grows

Aluminum prices moved up slightly during 1953, primarily reflecting increased labor costs. They continued to be close to 1939 levels and maintained their relatively favorable price position, compared to other metals and materials.

The abundant supply of aluminum during 1953 increased the industry's effort to develop new applications and new markets.

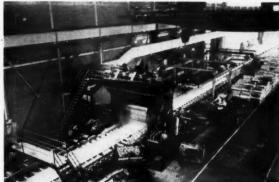
Building materials continued to be the largest market for aluminum during 1953. It is estimated that about

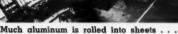


Lightest skyscraper proves versatility of aluminum



More than 95 percent of domestic bauxite was mined in Arkansas







... or drawn into wire cable

275,000 tons went into this market last year, about 40 percent more than in 1952 Aluminum panels for curtain wall construction of office and industrial buildings gained wide recognition during 1953. The advantages offered by aluminum were demonstrated during the summer when aluminum panels were used in the construction of a 26-story office building in New York City. In six and a half working days, three crews of five men each put in place the 1800 panels needed to wall in the entire building. Similar types of aluminum panels are being specified for scores of other large buildings in various parts of the country.

The automotive market for aluminum also advanced during 1953 with all of the major manufacturers using more aluminum than in earlier years. Some current models contain over 50 lb of aluminum each, five times as much as the average per car in earlier years. Aluminum is being used extensively for the bodies and engines of trucks, trailers and buses, with some truck models using over 2000 lb of aluminum per unit and close to 3000 lb going into some buses.

Wide acceptance of aluminum for many electrical wire and accessory applications expanded the 1953 electrical market for the metal. covered wire market, virtually nonexistent five years ago, consumed substantial tonnages of aluminum during 1953. Aluminum became the standard material for electric bulb bases during 1953. This application was also developed since the close of the war with the large scale use of aluminum by the major manufacturers getting under way in 1952. Aluminum is also being adopted for the bases of special type bulbs, such as flashlight and automotive. Aluminum for sheathing power and telephone cables is also being used increasingly as it proves itself much more economical than other materials.

Aluminum also entered the "do-ityourself" market towards the end of the year. Sheets, tubing, extrusions and fastening accessories are being

marketed in suitable sizes for home workshop use. The do-it-yourself aluminum products are designed to be used satisfactorily with regular woodworking tools.

Foreign Markets Soft

With aluminum markets soft in Europe, foreign fabricators shipped much larger quantities of their products to the United States market during 1953 than in any other year. Total imports of semi-fabricated aluminum during the past year probably amounted to 35,000 tons, about three times as much as the average yearly imports during the previous five years.

The application of the Buy American Act to semi-fabricated aluminum became an issue as a result of bids on Government contracts by importers of such products. The Aluminum Association filed a statement with the Defense Department opposing the exemption of foreign semi-fabricated aluminum from the provisions of the Buy American Act. The Defense Department ruled that such foreign products were not exempt and that the procedure set forth in a Department directive of June, 1952, be followed. This directive provides that bids by suppliers of any foreign materials or products be reviewed on a case by case basis at the secretarial level in the Department.

Outlook for 1954

Primary aluminum production is likely to be higher in 1954 than last All of the new capacity built since the Korean War started should be in full production by the second quarter of 1954. Anaconda Aluminum Co. expects to initiate its production during 1954. Present indications are that with capacity operation, the four domestic producers should have a total output of 1,400,000 tons in 1954, about 12 percent above the record level reached in 1953. There is no prospect of any decline in imports or secondary production. Total 1954 supply should therefore exceed last year's 1,790,000 tons

The aluminum industry is confident that it will be able to develop a larger market for its products during 1954 because of its favorable ore supply and price position and because the prospects are bright for new applications.

Coal Preparation

(Continued from page 66)

The Rochester and Pittsburgh Coal Co, is doing some experimental work with the Impingo dust collector. This idea is to pass dust laden air through a filter bed of sized coal or refuse.

One of the principal advantages of gaseous and liquid fuels, apart from greater convenience in use, has been the uniformity of the product. It is only in recent years that the coal industry has become really conscious of this important factor and developed statistical methods of measurement. More attention is now being paid to blending before cleaning and to layer loading, which is a simple and inexpensive way of ironing out variations. Looking forward to a marked increase in the use of coal for power generation, we should expect more and more attention to be paid to production of a more uniform product. In many cases it is the cheapest way to increase the value of coal to the consumer. By uniformity we mean not only the ash and sulphur content, but also the uniformity in size consist. particularly in slack and nut slack.

In the preparation of this article I am indebted to many people for kindly furnishing information, in particular I would mention John Griffen, T. W. Guy, W. S. McAleer, W. C. McCulloch, A. W. Holmes and R. E. Zimmerman.





Mechanical loading equipment sales rose in 1953

Sales of Coal Mine Equipment

Number of Mechanical Loading Units Sold During 1953 Greater Than in Previous Year as Percentage of Mechanically Mined Coal Continues to Increase

By W. H. YOUNG and R. L. ANDERSON

Respectively, Chief Bituminous Coal and Lignite Section, and Mining Engineer U. S. Bureau of Mines

SHIPMENTS of mechanical loading equipment for underground use in coal mines in the United States, in terms of capacity, were 14 percent more in 1953 than in 1952. The capacity of mechanical cleaning equipment sold for use at bituminous-coal mines was 20 percent less in 1953 than in 1952. Shipments of shuttle cars for use in coal mines in the United States increased two percent in 1953 over 1952, while all conveyor shipments decreased during the same period.

This survey was made possible by the courteous cooperation of all known manufacturers of mechanical cleaning equipment for bituminous coal mines and manufacturers of mechanical loading and supplementary haulage equipment for use in all coal mines in the United States. Data from various trade journals were also utilized.

Mechanical loading units and supplementary haulage equipment "Sales in 1953" represent shipments made during the year. Of the total capacity of mechanical cleaning equipment sold in 1953, 27 percent was placed in operation during that year; the remainder will be installed later.

Mechanical Loading

Bituminous coal and lignite mechanically loaded in underground mines decreased from 304,255,921 tons in 1951 to 270,499,656 in 1952 (11 per-

cent). Mechanical loading in Pennsylvania anthracite mines decreased from 10,847,787 tons in 1951 to 10,034,464 in 1952 (eight percent).

Table I shows data on bituminous coal and lignite production, by methods of mining, and mechanical cleaning for 1951-53, inclusive. The percentage of this total output mechanically loaded and mechanically cleaned continues to increase. During 1953 approximately 84 percent of the total output was either mechanically loaded at underground mines or loaded by power shovels at strip mines.

Underground production of bituminous coal and lignite, by methods of loading, is shown in Table II. Production by continuous mining machines and coal recovery augers is shown separately for the first time in 1952. Practically all auger mining is

TABLE I—BITUMINOUS-COAL AND LIGNITE PRODUCTION, BY METHODS OF MINING AND MECHANICAL CLEANING, IN THE UNITED STATES, 1951-53, INCLUSIVE

	1951 Thousands of net tons	% of total	1952 Thousands of net tons		1953 ¹ Thousands of net tons	% of total
Surface stripping	117,618 111,791	22.0 21.0	108,910 87,431	23.3 18.7	107,000 74,000	23.8 16.4
Mechanically loaded under- ground	304,256	57.0	270,500	58.0	269,000	59.8
Total production Mechanically cleaned		$\frac{100.0}{45.0}$	466,841 227,265	100.0 48.7	450,000 237,000	100.6 52.7

¹ Preliminary.

done along the high walls at strip mines and the tonnage is included with underground mechanically loaded The preliminary figures for coal. 1953 show that 78 percent of the underground output was loaded mechanically, and the remainder, (22 percent), was hand loaded into mine cars.

Types of units sold. Table III lists the number of mechanical loading and conveyor units shipped for underground use at all coal mines in the United States, 1948-53, inclusive. Shipments of mobile loading machines and continuous mining machines together, increased from 206 in 1952 to 248 in 1953, (20 percent). Sales of continuous mining machines and coal recovery augers are shown separately in 1953 for the first time. Shipments of scrapers and shuttle cars increased



With 3844 shuttle cars in service in 1952, new sales rose 2.1 percent in 1953

eight and two percent, respectively, from 1952 to 1953. "Mother," room or transfer, and face conveyors all decreased in 1953 from 1952.

Exports of underground mechanical-loading equipment in 1953, in terms of capacity, amounted to 15 percent of the shipments to mines in the United States compared with 41 percent in 1952.

Types of mechanical-loading equipment sold compared with units in use. Table IV shows the trend in demand for various types of mechanical-loading equipment.

Table V shows the number of mechanical loading units shipped to various states in 1953 compared with the

number in use in 1952, as reported by mine operators. Sales of room conveyors as listed in Table V are not exactly comparable with the number of room conveyors in use. To avoid duplication in tonnage mechanically loaded, the mine operator was instructed to report "hand loaded" and "self loading" conveyor tonnage only: therefore, room conveyors loaded by mobile loaders are not included under the column "Room Conveyors in Use in 1952."

Haulage Equipment

Shuttle cars. Sales of shuttle cars increased from 428 in 1952 to 437 in 1953. Details of shipments to various states in 1952 and 1953 are given in Table VI. There were 3844 shuttle cars in use in bituminous-coal and lignite mines in 1952. Details of the number of cable-reel and battery-type shuttle cars in use, by states, 1951-52, inclusive, are given on page 26, Bureau of Mines Mineral Market Summary No. 2222. Exports of shut-

TABLE II-—UNDERGROUND BITUMINOUS-COAL AND LIGNITE PRODUC-TION, BY METHODS OF LOADING, 1951-53, INCLUSIVE

	195	51	198	52	19531		
	Thousands of net tons	% of total	Thousands of net tons	% of total	Thousands of net tons		
Mobile loading machines:							
Loading direct into mine							
cars		24.7	75,605	21.1	(3)	(8)	
Loading onto conveyors	11.229	2.7	11.079	3.1	(3)	(3)	
Loading into shuttle cars		33.4	132,297	37.0	(1)	(3)	
Continuous mining machines	8 (2)	(2)	8.215	2.3	(2)	(a) (a) (a)	
Augers	(2)	(2)	1.506	0.4	(3)	(8)	
Scrapers		(4)	77	(4)	(*)	(2)	
Conveyors equipped with duckbills or other self	1	. ,		. /	. ,	,	
loading heads	13,884	3.3	10,590	3.0	(3)	(8)	
Hand-loaded conveyors	37,583	9.0	31,131	8.7	(*)	(8)	
Total mechanically	V						
loaded	304,256	73.1	270,500	75.6	269,000	78.4	
Hand loaded into mine cars	111,791	26.9	87,431	24.4	74,000	21.6	
Total underground	d		-		-	-	
production		100.0	357.931	100.0	343,000	100.0	

¹ Preliminary. ² Included with mobile loading machines. ³ Included with "Total mechanically loaded." ⁴ Less than 0.05 percent.

TABLE III—NUMBER OF MECHANICAL LOADING AND CONVEYOR UNITS SOLD FOR UNDERGROUND USE IN COAL MINES, AS REPORTED BY MANUFACTURERS, 1948-53, INCLUSIVE

Type of equipment:	1948	1949	1950	1951	1952	1953	Change from 1952 (percent)
Bituminous-coal and lignite							
mines Mobile loading machines Continuous mining machines	723	286	289	287	206	180 67	+19.9
Augers Scrapers ²	(1) 17 (3)	(1) 8 543	$^{(1)}_{465}$	$\frac{\binom{1}{4}}{524}$	(1) 8 428	57 11 437	$^{(1)}_{+37.5}$ $^{+2.1}$
Shuttle cars Conveyors: ' "Mother"	230	116	132	114	67	58	—13.4
Room or transfer	$1,025 \\ 356$	394 160	316 116	297 111	155 76	87 49	-43.9 -35.5
Anthracite mines (Pennsyl-							
vania): Mobile loading machines Scrapers ³	$\frac{2}{32}$	10	··· · · · · · · · · · · · · · · · · ·	8	5	1 3	-40.0
Shuttle cars	(³)	* * *				* * *	* * *
"Mother"	184	147	57	34	34	16	-52.9
Face ⁵	18	5		8	13	2	-84.6
Number of manufacturers reporting	22	22	20	21	22	25	* * *

Not available. Total number of augers sold 1946-52, inclusive, was 271.
Reported as acrapers or scraper haulers and hoists.
Total number of shuttle cars sold 1936-48, inclusive, was 2849.
Conveyors are classified as to the length the power unit has capacity to take: "Mother," capacity over 500 ft.; room or transfer, capacity 100 ft to 500 ft; face, capacity under 100 ft.
Includes "bridge" conveyors, beginning in 1950.

TABLE IV—SALES OF MECHANICAL-LOADING EQUIPMENT IN 1953 COMPARED WITH MACHINES IN ACTIVE USE IN PRECEDING YEARS

	Num	ber of ma	chines in act	ive use, as	reported l	by mine ope	erators	Number of machines sold as reported by manu-
	1946	1947	1948	1949	1950	1951	1952	facturers in 1953
Bituminous-coal and lignite mines; Mobile loading machines. Continuous mining machines. Augers Scrapers Pit-car loaders Conveyors equipped with duckbills or other	75 93	$\frac{3,569}{\frac{-}{67}}$	3,980 }	4,205 46 17	4,318 	4,410 22 (1)	4,083 152 61 19 (1)	180 67 57 11 (²)
self-loading heads Hand-loaded room conveyors, number of	1,521	1,531	1,632	1,483	1,329	1,242	1,049	(3)
units Anthracite mines (Pennsylvania);		3,979	4,125	4,312	4,434	3,904	3,569	87
Mobile loading machines Scrapers Hand-loaded room conveyors, number of	$\begin{array}{c} 27 \\ 564 \end{array}$	$\begin{array}{c} 25 \\ 594 \end{array}$	$\begin{array}{c} 19 \\ 643 \end{array}$	$\begin{array}{c} 27 \\ 589 \end{array}$	$\begin{array}{c} 30 \\ 556 \end{array}$	$\begin{array}{c} 43 \\ 528 \end{array}$	$\begin{array}{c} 54 \\ 456 \end{array}$	$\frac{1}{3}$
units4		3,457	3,562	3,618	3,460	3,282	3,232	16

¹ Canvass of pit-car loaders in use discontinued in 1951.
 ² Canvass of sales of pit-car loaders discontinued in 1945.
 ³ Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded room conveyors.
 ⁴ Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

tle cars decreased 52 percent in 1953 from 1952.

Face conveyors. A face conveyor is 10 to 100 ft long and is used parallel to the face of the room to move material along the face to a room con-Table III lists total sales, 1948-53, inclusive, and Table VI lists sales, by states, for 1952 and 1953. Data on number in use are not available.

"Mother" conveyors. For the purpose of this study a "mother" conveyor is defined as a sectional, exten-



'Mother" conveyor sales were down for the year

TABLE V-MECHANICAL-LOADING EQUIPMENT IN ACTUAL USE IN 1952, BY STATES, COMPARED WITH SALES REPORTED IN 1953

State	Mobile loading machines		Mobile loading machines Continuous mining machines		99000	Singers	Scrapers		Room conveyors1	
	In use in 1952	Sales in 1953	In use in 1952	Sales in 1953	In use in 1952	Sales in 1953	In use in 1952	Sales in 1953	In use in 1952	Sales in 1953
Bituminous-coal and lignite mines :										
Alabama	130	8	6	2			1		201	1
Alaska	1						6		2	
Arkansas									68	
Colorado	34	1	4				1		239	
Illinois	367	4	18						22	
Indiana	121	7		3					2	
Iowa	1								3	
Kentucky	483	18	10	2		5			537	17
Maryland					. 5	1			14	
Montana	26								11	
New Mexico	16						1		2	
North Dakota	4									
Ohio	194		11	3	8	11			76	6
Oklahoma	5								145	
Pennsylvania	938	40	71	40	5	8	8	4	815	7
Tennessee	28	2				2			76	
Utah	124	8	2	2				1	76	
Virginia	148	22		2	1	2			155	5
Washington			5	1			8		96	
West Virginia.	1,428	65	23	12	42	28			1,864	51
Wyoming	35	5	2						214	
				_	_	-	-	-	-	-
Total bitumi- nous coal										
and lignite	4,083	180	152	67	61	57	19	11	4,618	87
Pennsylvania an- chracite mines	54	1					456	3	$3,232^{2}$	16
Grand total	4,137	181	152	67	61	57	475	14	7,850	103

¹ Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads.

² Includes also pit-car loaders.



sible, power-driven conveying unit that can handle over 500 ft of conveyor. Main-slope conveyors are excluded. Table III lists sales, 1948-53, inclusive, and Table VI shows shipments by states, in 1952 and 1953. In 1952, 358 bituminous-coal mines used 308 miles of "mother" conveyors. Detailed data by states on "mother" conveyors in use, 1945-52, inclusive, are given on pages 26 and 28 of Bureau of Mines Mineral Market Summary No. 2222. Exports of "mother" conveyors decreased 50 percent in 1953 from 1952.

Mechanical Cleaning

Reports from 21 manufacturers of bituminous - coal - cleaning equipment show that the total capacity of 1953 sales was 7000 net tph of clean coal, compared with 8700 tons capacity sold in 1952, a decrease of 20 percent. Sales in 1953, by type of equipment, in terms of capacity, show that dense medium ranked first, followed by jigs, and wet tables. The capacity of all types of equipment sold in 1953 for cleaning bituminous coal by wet methods was equivalent to four percent of the bituminous coal cleaned by wet methods in 1952, while the capacity of pneumatic equipment sold in 1953 was five percent of the tonnage pneumatically cleaned in 1952. Approximately 60 percent of the total capacity of cleaning equipment sold in 1953 was for additions to present installations and the remainder comprised new plants.

Table VII gives data on bituminous coal cleaned in 1952, by states, and the annual capacity of equipment sold in

TABLE VI—SALES OF FACE CONVEYORS, SHUTTLE CARS, AND "MOTHER" CONVEYORS, 1952-53, BY STATES

	Face conveyors ¹		Shuttle cars		"Mother" conveyors	
	1952	1953	1952	1953	1952	1953
Bituminous-coal and lignite mines:						
Alabama			35	27		3
Colorado	3		5	2		1
Illinois			14	17	14	12
Indiana				6		
Kentucky		8	42	49	17	5
New Mexico					2	
Ohio			4	7	1	
Oklahoma	4		2			3
Pennsylvania	10	1	127	140	6	14
Tennessee			2	2		
Utah			7	10	1	1
Virginia	2	1	24	45		1
West Virginia	44	39	166	118	26	18
Wyoming				14		
	_		-		-	-
Total	76	49	428	437	67	58
Anthracite mines (Pennsylvania)	13	2			* *	
			100	400	-	-
Grand total	89	51	428	437	67	58

Includes "bridge" conveyors and all other conveyors 10 to 100 ft in length,

TABLE VII—BITUMINOUS COAL MECHANICALLY CLEANED IN 1952 COMPARED WITH SALES OF MECHANICAL CLEANING EQUIPMENT IN 1953, BY STATES

		1953 Annual		
State	Number of plants in operation	Net tons of cleaned coal	Output mechanically cleaned (percent)	capacity of equipment sold (net tons)
Alabama	. 43	9,801,444	86.1	499,000
Alaska	. 2	265,529	38.7	(2)
Arkansas				(2)
Colorado	. 5	1,485,290	41.0	
Illinois	69	36,402,615	79.5	496,000
Indiana	. 27	12,935,513	79.1	
Kansas	63	1,174,053	57.9	
Kentucky	. 76	27,710,824	41.9	1.187.000
Missouri	. 10	2,578,768	87.3	
Montana	. 2	104,150	5.0	
New Mexico	. 1	143,681	18.9	
Ohio	. 27	14,771,814	40.8	(2)
Oklahoma	. 5	628,083	28.6	
Pennsylvania	. 89	40,740,4143	45.7	1,921,000
Tennessee	. 6	406,720	7.7	(2)
Utah	. 6	2,497,890	40.7	(2)
Virginia	. 33	7.786,248	36.1	1,205,000
Washington	. 16	821,788	97.3	(2)
West Virginia Undistributed	OOM	67,009,8064	47.3	3,486,000 435,000
Total	625	227,264,630	48.7	9,229,000

Based on average days mines were active in 1952 and 7.0 hours per day.
 Included in "Undistributed."
 Includes some coal mined in Pennsylvania and cleaned in Ohio, and a small tonnage mined other States and cleaned at a consumer-operated plant in Pennsylvania.
 Includes some coal mined in West Virginia and cleaned in Pennsylvania.



Sixty percent of the coal cleaning equipment sold in 1953 was for addition to present plants



Photos courtesy U. S. Vanadium Co

The Colorado Plateau continues to be the scene of much important activity in the search for uranium

Uranium

New Uses for Isotopes, New Deposits Found, Worldwide Interest Shows No Abatement as U. S. Experimentally Produces Electricity From Nuclear Energy

By THOMAS E. GILLINGHAM

Chief, Physical Exploration Branch Division of Raw Materials U. S. Atomic Energy Commission

THE second decade of the Atomic Age opened in November, 1952, and throughout 1953 more and more of the important news was focused on the atom. Headlines told of spectacular new uses of radioisotopes in medicine and research, including research on the treatment of cancer and the investigation of the mysteries of plant growth: of the growing participation of American industry in schemes to harness nuclear energy for power; and, of course, of the many international problems relating to the atom. The high point of interest was President Eisenhower's notable address before the United Nations on December

The first atom-powered submarine, the Nautilus, was nearly completed by the end of the year and the keel of

the second atom submarine, the Sea Wolf, was laid on September 15. In the field of nuclear reactor development the Atomic Energy Commission announced that great strides had been made in the work on reactors for power generation, for nuclear propulsion, and for the improved production of fissionable materials. "Breeding," which means the production in a reactor of as much nuclear fuel as is consumed in the production of heat energy, was successfully demonstrated at the National Reactor Testing Station at Arco, Idaho, and at Oak Ridge, Tenn., about 150 kw of electricity was generated by nuclear energy. Several teams of American industry studied the possibilities of applying nuclear energy to commercial power generation and the preliminary findings have

. . . . Nature, as in duty bound, Deep hid the shining mischief under ground.

-Pope, Moral Essays.

been published in "Reports to the U. S. Atomic Energy Commission on Nuclear Power Reactor Technology" (for sale by Superintendent of Documents, Government Printing Office, Washington, D. C., price 25 cents).

In 1953, the foundations of a 50,000 kw nuclear power plant were laid at Calder Hall, Cumberland, England. The plant will be in operation in late 1955 and is reportedly expected to generate electricity at about twice the conventional British cost. With diminishing reserves of cheap fuel, England's power problem is more pressing than ours, and it has been predicted by Lord Cherwell, Paymaster General of Britain, that within 30 years uranium will be substituted for coal in all of England's industries. What the future holds for applications of atomic knowledge is a fertile field for the imagination. After retiring from the chairmanship of the AEC, Mr. Gordon Dean, writing for the August 25, 1953, issue of Look said:

"I believe, and I feel that nearly everyone associated with the atomic energy program believes, that there is even more in the atom than scientists are capable of dreaming of. Even if there is not, however, it is still possible for us to visualize an era in which new opportunities for employment and investment will be created, new regions of the earth opened up and developed, new products manufactured and marketed, new life-saving techniques introduced into the world of medicine."

In the field of uranium raw materials 1953 was a good year. In America and Canada both mine production and ore reserves increased notably, several important new ore deposits and at least one promising new area were discovered; significant improvements were made in uranium ore processing and in the techniques of geology, geophysics, and physical exploration for new ore.

Extend Incentives Period

During the first nine months of the year the uranium miner was beset with fears that the basic ore price schedule and the various incentive payments might soon expire. But then, on September 23, the AEC, in effect affirming that the demand for uranium had not diminished, an-

nounced the extension of the basic price schedule to April, 1962, and of the initial ore production bonus to February 28, 1957. These announcements were reflected by an immediate surge in requests for AEC certification of properties for the initial production bonus, and by a marked increase in private exploration.

It is of interest to note here that as of November 6, 1953, a total of \$2,-535,000 has been paid by the AEC to miners on the initial production bonus. which is an incentive payment to get new mines started. This bonus can reach a maximum of from \$15,000 to \$35,000, depending on the ore grade, for the first 10,000 lb of contained U3O8 in the ore shipped from a single property. Over 325 properties have been certified for the bonus, 1626 separate bonus payments have been made, and 43 properties have earned the maximum bonus since the program was started.

The problem of the rights of miners to hold uranium claims on prior Federal mineral leases was at least partially clarified in 1953 by the passage of Public Law 250. This law provides in effect a means of holding land included in claims staked on leased ground between July 31, 1939, and January 1, 1953, subject to certain limitations and regulations.

New Ore Discoveries

With the remarkable growth of the uranium mining industry it is becoming increasingly difficult to review adequately in a few paragraphs even the most significant geographical developments during a year. In the December, 1953, issue of this JOURNAL, the reviewer, in discussing the opportunities in uranium mining, summarized the important facts of world occurrences of uranium ores. The following paragraphs, therefore, will mostly supplement the earlier article.

Without doubt the most important developments in the domestic uranium field in 1953 were in the Big Indian Wash area of San Juan County, Utah, about 20 miles southeast of the town of Moab, Utah. There, behind a high escarpment overlooking the wash, a young geologist named Charles Steen drilled through 14 ft of high grade uraninite ore on July 6, 1952. No very impressive outcrops existed in the area, but Steen's hunch that ore should occur in the slightly dipping rocks behind the rim proved correct. Steen's Mi Vida mine commenced shipping in February, 1953, and by September had shipped over \$1,000,000 worth of excellent ore averaging over 0.4 percent U₃O₈. Last summer a uranium rush engulfed the Big Indian Wash country; AEC drills disclosed another huge deposit at a depth of 250 ft on the Cal-Uranium Co. property, three miles north of the Mi Vida mine; and at least a half-dozen other deposits have lately been found

by claim owners. By March, 1954, 35 private drills will be operating at Big Indian, and two vertical shafts will be sinking toward the orebodies, which here lie in the sandstones of the Chinle formation. The ore reserves of this new area may soon rank it near the top of the known domestic sources of uranium.

Elsewhere on the Colorado Plateau many small, and a few large orebodies were either discovered or further explored during 1953. In the Jo Dandy area, 11 miles south of Uravan, Colo., the U.S. Geological Survey found an important tonnage of new ore by relatively deep core drilling. Since 1947, the survey has conducted intensive geological studies and drilling, on be-half of the AEC, in the mineral belt around Uravan. As a result of its discoveries on land withdrawn from Public Domain, a number of mining leases have been granted on a royalty basis by AEC to qualified operators. On two of these leases, operated by Shattuck Denn Mining Co. and by Golden Cycle Corp., respectively, vertical shafts were sunk in 1953 to the Salt Wash ore horizons at depths greater than 500 ft. The Golden Cycle shaft, which bottomed at 647 ft, is the deepest mine on the Plateau. These operations indicate a trend towards deeper mining and also the willingness of established, conservative companies to invest capital in the uranium business.

At Shiprock, N. M., ore from the nearby Lukachukai and Carrizo Mountain area continues to be stockpiled in anticipation of the opening of a new mill now being constructed by Kerr-McGee Oil Industries, Inc. Farther to the southeast, at Grants, N. M., the Anaconda plant to treat uraniferous limestone ores of the area, commenced operations in the early fall. At nearby Laguna, Anaconda is developing an exceptionally large and continuous orebody of the sandstone type, which may justify another mill or another type of circuit at the present mill.

Recent exploration in the vast and rugged Inter River area, near the confluence of the Green and Colorado rivers, has been very encouraging, and a small quantity of excellent ore was produced in 1953 from the old Meeker district in northwestern Colorado.

Production of ore continued at a good rate from the established Plateau camps, including those around Uravan, Colo., Hite, Utah, and the San Rafael Swell, Utah.

New Uranium Rush

Plateau type mineralization was found in September on the western slope of the Gas Hill anticline, in the Wind River basin of Fremont County, Wyo., by a prospector named Neil McNeice. Another rush ensued; surface mineralization was found over a



A 100,000-ton orebody of typical Colorado Plateau ore is worth \$3,000,000, a good target for any prospector

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wide area at horizons ranging from the Jurassic Morrison formation to the Eocene Wasatch formation. But as winter closed in, no conclusion could yet be drawn as to the shape, size, or average grade of the individual deposits.

As new areas are opened in central and eastern Wyoming, ore continues to be mined in the Edgemont district of South Dakota and in the Carlile area of the Northern Black Hills. From near Carlile, Homestake Mining Co. is regularly shipping good grade carnotite ore to the Edgemont buying station.

In retrospect, the progress in the domestic uranium field during the past three years has been very encouraging. In 1950 only four known domestic uranium deposits in the west contained more than 100,000 tons. Today, 15 deposits can be listed in that category, although some of these have been depleted by mining. There can be no doubt that future exploration will disclose others of the same magnitude. A 100,000 ton orebody of typical plateau ore would be worth at least \$3,000,000—a sizable target for any prospector.

AEC Drilling Program

During 1953, AEC-sponsored drilling for uranium in the United States totaled 1,331,905 ft in 7186 holes. Of this total, 1,207,302 ft in 5810 holes were drilled on the Colorado Plateau by the AEC and the U. S. Geological Survey. Since the program commenced in 1947, Government-spon-

sored Plateau drilling has totaled about 3,700,000 ft in about 25,000 holes. Recent drilling by the AEC has been 71 percent diamond drilling, 21.5 percent wagon (percussion) drilling, and 7.5 percent rotary drilling. Standard practice for core drilling is to obtain BX size core where possible. The trend is toward slightly larger percentages of the less expensive wagon and rotary types of drilling and toward combinations of core and non-core drilling on the same project.

Foreign Progress

In foreign fields, notable progress was made in 1953 in Canada, South Africa, and Australia. The new milling plant at Eldorado's Ace mine at Beaverlodge, Saskatchewan, commenced operation in April. The famed Gunnar deposit at Beaverlodge was explored by further drilling with excellent results, and it is reported that a large mill is planned for the property. Several other new orebodies were found in the general area, which was the scene of tremendous activity during the year.

In the country around Blind River, Ontario, near the north shore of Lake Huron, prospectors and diamond drillers have been very active during the past year. The object of their search is to find minable orebodies in a 25 mile stretch of country that contains three more or less parallel ridges formed by outcrops of gently dipping quartzite beds. Within these beds are several fairly continuous conglomeratic zones in which, in places, fine

grained uraninite and apparently a uranium-titanium mineral are concentrated. At least two companies, Pronto Uranium Mines and Algom Uranium Mines, have large tonnages of rather low grade ore blocked out by drilling.

Late reports from South Africa state that 17 Transvaal and seven Orange Free State gold mines are now either active or potential producers of uranium. By 1955 all but two of these 24 mines are expected to be producing uranium. Already several producers have announced dividends credited to uranium, and the outlook for future dividends from uranium is even brighter.

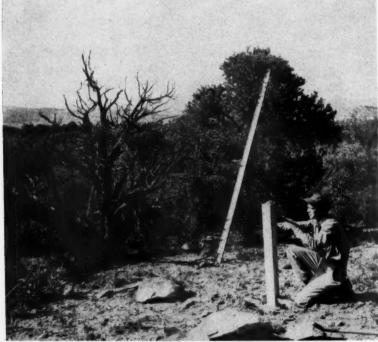
The validity of last year's prediction respecting developments in Northern Rhodesia came with the recent report of the construction of a pilot plant for uranium recovery from the copper ores of the Mindola mine at Nkana.

In Australia, several promising discoveries were made in 1953. In the Northern Territories, private prospectors joined the search for new deposits following the announcement by the Commonwealth Government that private miners and mining companies may apply for prospecting authorities and uranium leases. Two large companies, Gold Mines of Australia, Ltd., and Western Mining Corp., have announced their intentions to enter the uranium field, and other companies are being formed for the same pur-The Commonwealth Government has contracted with Zinc Corp., Ltd., through a new subsidiary company, Territory Enterprises Pty., Ltd., for the development of the Rum Jungle deposits near Darwin. Production from Rum Jungle should be forthcoming in 1954.

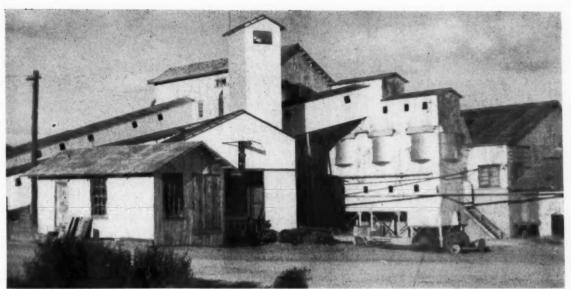
At Radium Hill, in South Australia, mine development progressed on two levels from the 400-ft shaft. Production should start about mid-1954. The ore will be concentrated at the mine and railed to a new treatment plant at Port Pirie. The Radium Hill project is an activity of the South Australian Government, which is active also in prospecting and in process studies. Recent reports mention a new discovery of high grade uraninite ore in biotite schists at Myponga, about 40 miles south of Adelaide, but little is known of the size of the deposit.

These were the uranium highlights of 1953. Behind the still paramount and undiminished military requirements, we can see a growing interest in other aspects of the metal. There is hope that uranium will be something more than the "shining mischief" whereof the poet speaks.

Finally, to those who may be interested in searching for or mining uranium ore, the Division of Raw Materials of the AEC is ready to advise and assist in every way it can.



With the extension of the basic price schedule and incentive bonuses, exploration activity surged forward anew



No domestic tungsten mine could show a profit at market prices if it were not for DMPA purchases

Tungsten, Mercury, Chromite, Nickel

Domestic Tungsten Production Exceeds Consumption But Would Not Exist Without Support, Mercury Hangs on by the Skin of Its Tariff, Chromite Production Could Be Increased, Nickel Output Growing

By W. LUNSFORD LONG

Vice-President and General Counsel Tungsten Mining Corp. President, The Tungsten Institute

Tungsten

FOR THE first time since accurate production and consumption figures of tungsten concentrates have been kept, due to the stimulus provided by the Government's domestic buying program, domestic production exceeded consumption in 1953. Production for the year was 8,700,000 lb of contained tungsten (about 550,000 units) as compared to 7,230,000 lb (about 456,000 units) for 1952, an increase of 20 percent. Consumption of tungsten concentrates in the United States for 1953 was in the amount of 8,000,000 lb as compared to 8,634,000 lb for 1952, a decrease of seven percent. The breakdown of consumption for 1953 shows that 35 percent went into steel and ferro-tungsten, 45 percent into hydrogen-reduced metal powder, and the remainder into carbon reduced metal powder, tungsten chemicals and miscellaneous products. Production for 1953 did not approach the all time high of 1943 which was 11,473,000 lb, nor did consumption for 1953 compare at all with the peak year of 1943 in which consumption was 19,313,000 lb.

In 1952 there was a strong downward trend in the world price of tungsten concentrates. In 1953 this trend continued, and at the year's close the world price of tungsten concentrates had declined to such a low level that even with duty added no tungsten mine operating in the country could have shown a profit. If it were not for the United States Government (DMPA) domestic purchase program, all of the domestic mines would today be shut down.

Use of tungsten in the welding trade during the year 1953 increased

and it is believed that further considerable growth in the use of tungsten may be expected.

Public Law 206 signed by President Eisenhower on August 7, 1953, extended for two years, or until June 30, 1958, the Defense Materials Procurement Agency's domestic tungsten purchase program. This law also extended for two years the domestic purchase programs of manganese, chromite, mica, asbestos, beryl, and columbium-tantalum-bearing ores and concentrates, but did not increase the quantity to be purchased under any of these programs. Because of the stimulus provided by extension of the delivery period two years, it is quite possible that these programs will end prior to their respective termination periods unless the Congress increases the amount to be bought.

As of December 28, 1953, Government purchases of tungsten concentrates under the domestic purchase program amounted to 573,776 short ton units of 60 percent WO₃. This is approximately 19 percent of 3,000,000 short ton units, the total amount authorized.

Facilities for the manufacture of hydrogen reduced tungsten carbide products within the past year have been greatly increased by new installations. Until this was accomplished there had been, at times in the past, very serious shortages of tungsten powder. Provided sufficient tungsten concentrates can now be had to feed these additional facilities it appears that this bottleneck has been removed and that these new facilities are now adequate for an emergency.

During 1953 the Tungsten Institute, incorporated under the laws of the District of Columbia, was organized in Washington, D. C. The purpose of

the Institute is to foster increased use of tungsten and promote the welfare of the domestic tungsten mining industry.

The Tungsten Institute has been active in behalf of domestic producers and filed a statement with the Randall Commission on Foreign Economic Policy. The statement set forth that an adequate normal peace time supply of tungsten can be produced annually in this country through sound production plans based on the operating efficiency that accompanies financial stability; that consumption in the United States during recent years of about 33 percent of the world's production of tungsten gives evidence to the role played by this metal and the increasing applications and uses of tungsten and tungsen alloys. The importance of tungsten carbide in military uses in World War II in connection with the use of tungsten carbide cores in high velocity armor-piercing projectiles was pointed out; also that tungsten alloys are indispensable in jet propulsion engines.

The Randall Commission was also informed that the United States produces approximately 20 percent of the Free World's output of tungsten, the principal mines being in California, Idaho, Nevada and North Carolina; that the principal sources of tungsten ore outside of the United States are South Korea, Portugal, Spain, Bolivia, Brazil, Burma, Canada, Australia and British Malaya; and that China was the world's largest supplier of tungsten prior to the seizure of that country by the Communists, but that its supply now goes to Russia.

A protective tariff of at least \$1.50 a pound of contained tungsten was recommended. This amount is 50 percent more than the original tariff of one dollar a pound, but is necessary under the present labor and material costs of domestic tungsten production.

This recommended tariff is three times the existing duty of 50 cents a pound.

Mercury

In the domestic quicksilver industry costs, primarily labor, continued to climb during 1953. The selling price of the metal, on the other hand, dropped slightly over 10 percent.

Little interest was shown in the search for ore in the opening of new deposits and little expansion was planned. DMEA programs at Almaden were unproductive, but at Idria they met with some success.

There was some increase in production at the New Idria Mine and at Cloverdale. Domestic production still stems primarily from the Idria, Mt. Jackson and Cordero Mines. Three-fourths of the domestic requirements still comes from abroad, and if the existing tariff on mercury were to be lowered every mercury mine in the United States would have to be closed and our needs would be wholly imported.

Chromite

In 1953 the production of highgrade metallurgical chromite was approximately 30,000 tons. Much more ore could have been produced if more funds had been available and if the enactment of Public Law 206 which extended the program had taken place during the early part of the year. Domestic production could be increased greatly if Government purchases were larger and if shipments of chromite were acceptable at railheads. The present purchase program is too limited to attract successful mining companies, including even the smaller ones.

Nickel

The Hanna interests of Cleveland will bring into production during 1954 near Riddle, Ore., the only nickel mining operation in the United States. The lateritic nickel deposit near the top of Nickel Mountain will be mined by open pit methods by the Hanna Coal & Ore Corp. and delivered to the smelters by an aerial tram. The smelters are located at the base of the mountain.

The ore will be sold at that point to Hanna Nickel Smelting Co. where it will be processed in an electric smelting plant for the production of ferro-nickel.

Construction of the first of four smelting furnaces is progressing under the direction of the Bechtel Corp. and is scheduled for completion by mid-1954. After a short break-in period with this furnace, a second furnace will be added, and all four furnaces should be operating by mid-1955.

The rate of operation is anticipated at 1800 tons of crude ore per day containing between 1.5 percent and 1.7 percent Ni. Production of the plant up to 126,000,000 lb of contained nickel in ferro-nickel is under contract to the United States Government. Construction of the smelter plant is being financed by a DMPA loan.

Minimum ore reserves are estimated to be 8,400,000 tons of 1.5 percent nickel content. Power will be supplied by Bonneville Power Administration and California-Oregon Power Co.

Free World Production

Since 1949, the year prior to the beginning of the Korean conflict, the nickel industry of the free world has increased its annual production from about 265,000,000 lb to approximately 340,000,000 lb in 1953, or over 25 percent. The further increase now achieved in International Nickel's production capacity expansion and other expansion programs under way in Canada and Cuba indicate that free world nickel production should reach about 385,000,000 lb in 1954.



If tariff on mercury were lowered every mercury mine in U.S. would close



Domestic chromite production could be larger if Government purchases were increased



Lone Star added a third kiln at its Lone Star, Va., plant

Portland Cement Hits New High

AS IN each of the years since World War II, the Portland Cement Industry set a new production record in 1953. Freliminary figures indicate that the peak reached was very close to 264,-000,000 bbl. This production came from 156 plants in 37 states and Puerto Rico. The increase over the 1952 record production of 249,000,000 bbl. was possible for several reasons. First, there were none of the crippling strikes that marked the labor scene in 1952. Second, the new mills which started producing late in 1951 and in 1952 were able to produce at close to full capacity throughout the year and third, a number of companies installed additional facilities in existing plants.

It is true that local shortages of Portland cement were reported from some areas, but by November 1 capacity to produce an additional 3,688,000 bbl. had been installed in the United With these and other pro-States. jected additions to capacity, the supply should be adequate. Among the individual companies reporting increased capacities, Marquette made major improvements at five plants. Peerless Cement Co. expanded in the Detroit area. This was one of the areas where shortages occurred during the year. Oregon Portland cement increased its capacity at Lime, Baker County, Ore., and Calaveras installed a fourth new kiln at San Andreas, Calif. Lone Star put in a third kiln at Setting Still Another Production Record, Industry Continues Expansion to Satisfy Growing Demand

its Sweetwater, Texas, plant and also a third kiln at the Lone Star, Va., plant. Southwestern Portland Cement will double capacity at Victorville, Calif. Lehigh Portland Cement Co. put its big plant at Bunnell, Fla., into operation in 1953. Universal Atlas will have one of the country's most modern plants when its old one at Universal, Pa., has been completely rebuilt. The Dragon Cement Co. reported construction of a new finishing mill at its Thomaston, Me., plant.

The Ideal Cement Co. opened its new research center and laboratory at Boettcher, Colo. Work performed here will deal not only with production of cement but also with specialized end uses of cement and with related fields.

Operating Developments

The whole cement industry has been moving toward the elimination of the more arduous physical work around the mills and garries. Scoop-loaders have replaced hand shovels; lift trucks and chain hoists, tractors, bulldozers and car spotters are doing much of the heavier work. Rotary drills are being used more extensively. Milli-

second delay blasting is reported to improve primary breaking, thus greatly reducing the need for secondary blasting.

Considerable interest has been shown in the pre-heating of dry kiln feed in a suspension-type pre-heater installed on one of the rotary kilns of the Allentown Portland Cement Co. Substantial fuel savings and increased capacities are claimed.

At its new Bunnell, Fla., plant, Le-high innovated the use of staurolite (an iron aluminum silicate) in place of clay or shale in cement manufacture. An attempt to understand better the still mysterious reactions between Portland Cement and water will be made through the use of radioactive sodium as a tracer.

Outlook

In 1953, total highway construction, it has been estimated, will reach \$5,453,000,000 compared to \$5,014,-000,000 in 1952 and \$4,541,000,000 in 1951. Awards of contracts for concrete pavement for first 10 months of 1953 totaled 68,705,527 sq yd. Estimates for 1954 indicate an even higher expenditure in that year. News

items throughout the year point to new road-building activities all over the nation. The general public is aware of the inadequacies of the road systems, and plans are afoot in Texas, Ohio, and Michigan, among other places for new express highways. The Governors of Indiana, Kentucky, Tennessee, Georgia and Florida announced tentative plans for a throughway from Chicago to Miami. The cost for this 1400-mile highway may be in the neighborhood of \$1.5 billion. The announcement came in connection with the appointment of a two-man committee to report on the feasibility of the project. Financing will be taken care of by the several states affected, each in its own way. Some of them have toll-road authorities and will defray cost in that way.

An idea of the staggering number of bridge, highway and dam construction projects, planned under way or recently finished, can be gained from the review of the aggregates industry on pages 67 and 68.

Heavy construction awards for the first 45 weeks of 1953 totaled \$13,018,-447,000. This figure was six percent

under the all-time high of 1952, but it's still the second highest year in our country's history. Future building will probably be in public buildings—churches, schools, etc., with homes following next. It has been estimated that there will be a need for at least 1,000,000 new homes each year until 1960 when the number will increase because then all the babies born in the 40's will be establishing families themselves.

Probably the outstanding characteristics of 1953, as far as the cement industry is concerned, was evidence that the long-time sellers' market was just about over. Competition was stiffer among manufacturers and promises to be more so in the period ahead.

Part of the competition in the future will come from Europe. When European companies have satisfied their own demands for Portland cement, that is, when rehabilitation of war wreckage is nearly complete, much European cement will seek markets in this country. So far, our own requirements have been so high that the small amount of imported

material has not been an economic factor in the U.S. market.

Safety

The cement industry maintained its excellent safety record. Seven Joseph A. Holmes awards were made to various companies in the industry. More than 7,517,000 man-hours of accident-free exposure were recorded in the citations accompanying these awards.

For the whole industry, the latest figures available from the U.S. Bureau of Mines (those for 1952) indicate a frequency rate of 6.64 accidents per million man-hours worked. This covers an estimated total of 73,890,000 man-hours. There were 21 fatal accidents (a frequency rate of 0.28 per million man-hours) and 470 non-fatal, lost-time accidents (6.36 per million man-hours) in 1952. Constant attention to safety through training, competition, awards; and in the construction and renovation of modern cement plants is responsible for these fine safety records turned in by companies in the industry. One company has not had a lost-time accident since April, 1941!

Anthracite Mining

(Continued from page 108)

sifier, froth flotation equipment, with input capacity of 200 tph.

Look at Culm Banks

As a result of the increased demand for fine coal, culm banks containing fines mixed with larger sized coal, refuse, etc., are receiving close attention. To recover fine size coal from banks of this type, the Glen Alden Coal Co. has erected preliminary cleaning plants at its Maffet and Bliss Banks, thereby eliminating transportation of undesirable material to its fine coal cleaning plant.

At the Maffet Bank the plant consists of a large hopper and a grizzly to remove the coarse material and two vibrating screens for the finer coals. Plus one-in. material is stocked at the site and will be available for preparation at a later date. Minus one-in. material is taken to the breaker and prepared for market.

Approximately 2300 tpd are processed.

Coarse bank material in the Bliss Bank, consisting principally of rock, large coal and pieces of wood, is scalped off by using a grizzly. Undersize is then run over a vibrating screen, after which the product is fed to two 48-in. Wemco Classifiers. The cleaned product is fed to a multipledeck screen, which separates the commercial product from the boilerplant coal. Overflow from the Wemco Classifier is sent to a nearby impounding dam.

Handling equipment used at these

operations consists of stacker, bulldozer and Barber-Greene loaders. The Bliss plant handles approximately 1000 tpd of bank coal.

Other Major Developments

Federal Engineers continued their long-range study of mine drainage and pumping in the Anthracite Region. The investigation phase of this project should be completed by July, 1954. This study has correlated data of various kinds, having both a direct and an indirect bearing on the final solution of the problem, which contemplates a minimum grade tunnel from slightly above sea level near Conowingo, Md., into the anthracite fields. As completion of the tunnel will take some time, the State of Pennsylvania is purchasing seven deepwell pumps of large capacity for emergency purposes. Four of these will be used in the Pittston District (three at Twin Shaft and one at Exeter Shaft), one at Springdale near Mahanoy City, and two at Scott Shaft near Shamokin. These pumps will be installed, operated and maintained by the coal companies under agreements with the State. The pumps will prevent the flooding of areas where mines are now in active operation.

Pumps, motors and electrical equipment to be purchased by the State will total approximately \$450,000. Large sums of money will have to be spent by the companies involved for additional equipment and installation, and they will bear the cost of operation and maintenance.

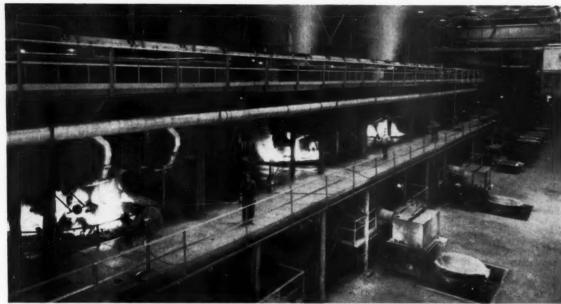
Governor Fine of Pennsylvania has appointed a commission of six to study the whole anthracite water problem and render a report, with recommendations as to its proper solution.

Among the noteworthy news items of the year was the sale, by the Glen Alden Coal Co., of its Lackawanna County coal holdings and operating facilities to the Moffat Coal Co. This is probably one of the largest sales of coal lands in the history of the anthracite region. Most of the lands involved were operated by the Moffat Coal Co. under lease from the Glen Alden.

Protect Anthracite User

THE anthracite industry, which is receiving the full cooperation of the United Mine Workers of America and the Commonwealth of Pennsylvania in an effort to protect the consumer in the quality of anthracite coal he buys, has reported progress.

Working together as the Anthracite Committee in a cooperative effort to make anthracite consumers quality conscious, this group, under powers granted by the Pennsylvania General Assembly, has the job of telling anthracite customers to insist that the weigh-bill and invoice for the coal they buy are stamped "Standard Anthracite" as the Pennsylvania law requires, and for referring to the Commonwealth for prosecution those who sell as standard anthracite a product whose quality falls below the levels the law prescribes.



Ferromanganese furnaces of the Anaconda Copper Mining Co., the nation's most important manganese producer

Manganese Mining and Metallurgy

Domestic Production and Imports Up as Price Slips in Year Marked by Increased Activity

By F. A. McGONIGLE

Vice-President and General Manager Manganese, Inc.

DESPITE a substantial increase in domestic manganese production during the period under review, the nation's supply of this strategic metal remained critical. In fact, the continued expansion of basic steel's capacity during the first half of 1953 largely offset the gains and aggravated an already serious imbalance between domestic demand and supply. Nevertheless, a review of events over the past year shows that some progress has been made in mine development and research work, and that an improved outlook for manganese production is justified.

Estimates based upon industry and government figures indicated that in 1953 domestic sources accounted for 145,000 long tons versus 95,000 long tons last year, of plus 35 percent grade ore for industrial consumption. Domestic producers supplied approximately 900,000 long tons of ore con-

taining less than 35 percent manganese to storage or government stockpiles in 1953.

Imports Up

Foreign ore, traditionally the only important source of manganese, was expected to exceed 3,100,000 long tons of 42 percent minimum grade. This represented an increase of 700,000 tons over the figure for 1952. Against these over-all supply figures it is anticipated consumption will approximate 2,100,000 long tons of 45 percent Mn ore versus 1,770,000 tons in 1952.

From the foregoing data, taking into account the fact that some 125,000 tons of ferromanganese were imported, it is apparent that the United States produced about 7 percent of its needs.

In order to give impetus to a domestic manganese industry the Government under General Services Administration instituted in 1952 a purchasing and stockpiling program, with depots at Deming, N. M.; Wenden, Ariz., and Butte and Philipsburg, Mont., with authorization to purchase a total of 18,000,000 long ton units of manganese, assaying not less than 15 percent Mn. The domestic or nation-wide purchase program for 19,000,000 long ton units minimum grade of 40 percent, was another phase of the over-all program to encourage the development of a manganese producing industry in the country.

The calculated purchases at the four depots, in long ton units, are as follows:

*** *			
Wenden, Ariz			
Deming, N. M	L	 	700,000
Philipsburg, 1			
Butte, Mont.		 	265,000
Total (estin	nated)	 	3,097,000

In accordance with Amendment B to DMPA Order-1 Government assistance was made available for Group B strategic metals and minerals, in which manganese is included. This assistance was to help finance 75 percent of the exploration cost of finding ores.

Prices Off

Ore prices eased off during the year. They were maintained at \$1.18-\$1.21 per L.T.U., c.i.f., U. S. ports, duty extra for Indian 46-48 percent ore. By December, these quotes were down to \$1.08-\$1.10. On long term contracts quotations approximated 90 cents c.i.f., U. S. ports, duty extra.

Ferromanganese of 78-82 percent grade was quoted \$225 per long ton

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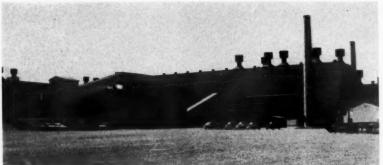
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Pioche Manganese Co. put a new plant into operation during the year at Henderson.

f.o.b. shipping point up to mid-June. At that time quotes were changed to net tons and in December the 76-80 percent grade f.o.b. Niagara Falls, N. Y., and Alloy, W. Va., was 13.15 cents per lb contained Mn. The 74-76 percent grade at Clairton, Sheridan and Johnstown, Pa., was \$200 per net ton. The various well-known pro-ducers of this alloy maintained their production rate.

Anaconda Copper Mining Co. continued to be the nation's most important producer of manganese, supplying over 90 percent of the domestic production for industry. Rhodochrosite ore assaying 15 percent Mn at the rate of 1500 tpd was mined by conventional methods in Butte. The ore is first treated by flotation to remove the sulphides, then this tailing is floated to produce a product containing about 38 percent Mn. Next the concentrate is upgraded by nodulizing to a product containing 58 to 60 percent manganese, 6.5 percent silica and 3 percent iron. Daily production of nodules averaged 370 long tons.

About two-thirds of the nodule product is used for the manufacture of standard ferromanganese in two plants located at Anaconda and Great Falls. The combined production of these two plants averaged 3350 long tons per month, with 80 percent manganese content, 11 percent iron, 6.5 percent carbon and 1 percent silica. The balance of the high-grade nodules were sold to the trade.

Use New Flotation Process

Manganese, Inc., at Henderson, Nev., started operation in September, 1952, and nodule production up to the end of 1953 was approximately 20,500 long dry tons, averaging 46.6 percent Mn. Stored concentrates and by-products accounted for an additional 17,800 long tons, averaging 41.2 percent Mn.

This company developed a new flotation process followed by nodulizing for upgrading low-grade oxide ores. Two serious setbacks occurred during 1953, one which involved a broken kiln and the second a fire which destroyed the flotation plant. Nodule production was resumed on stored concentrates in November, and the flotation plant was back in operation the latter part of January, 1954.

The flotation process used is an outgrowth of experimental work initiated by Robert Lord of Southwestern Engineering Co., and the United States Bureau of Mines, Boulder City station, during the past several years, and involves substantial quantities of soap, detergent, diesel oil, SO2 and soda ash as reagents. Ore will average 18 percent Mn and about 1 percent lead. A flotation concentrate containing 40 percent or more manganese is produced and nodulizes to a grade of 46 percent Mn or better, under 15 percent combined insoluble and about 0.35 percent lead. The lead is fumed off in the nodulizing process and collected by suitable scrubbers.

In June, Pioche Manganese Co., a subsidiary of Combined Metals Reduction, Inc., commenced operation of their ferromanganese plant at Henderson, Nev. The main source of manganese was from the operations at Caselton, Nev., where Combined Metals mined oxide and carbonate ores containing lead and zinc. The depression in base metal prices curtailed this program, causing raw ores to be purchased elsewhere, but while in operation the sulphides were floated first and the manganese was removed from the tailing, and nodulized in a rotary kiln. The two 7500-Kva electric furnaces in the Henderson plant produced either ferromanganese or silicomanganese. Production and grade figures were not available.

Activity Widespread

In the Philipsburg (Mont.) area, long famous for its production of high-grade battery type ore, there still was considerable activity. Two small dry magnetic separation mills were in operation. One was operated by the Taylor-Knapp Co. and had a capacity of approximately 2000 tons per month of crude carbonate ore, that averaged from 16 to 21 percent Mn. Production was from 500 to 700 tons per month of carbonate concentrate averaging about 32 percent Mn. This product was delivered to government stockpiles in Philipsburg. The sulphide byproduct had another market.

The second mill in the Philipsburg area was operated by the Trout Mining Co. Production for the year was about 10,500 short dry tons of 68 percent MnO2 battery grade concentrates, supplemented by some 6000 short wet tons of 24 percent carbonate ore and 5000 short dry tons of 33 percent MnO2.

The upgrading plant of the Domestic Manganese and Development Co., located at the Butte purchasing depot. was idle because guaranteed ore deliveries of at least 200 tpd were not forthcoming.

Teekay Mines, Inc., subsidiary of the Taylor-Knapp Co., operated a 100-tpd plant located near Tracy, Calif. Crude oxide ore of 20-30 percent MnO2 is treated by magnetic separator and tabling processes, and the production of 60-62 percent MnO2 concentrate was sold to the battery trade.

There were various small producers in Nevada, among whom were E. H. Potter at the Black Rock Mine at Valmy; Wilkins & Truman at the Hurley Mine and W. J. Franklin of Lucky Star Mine, both in the Pioche District; the Sonoma Mines southeast of



Manganese, Inc., developed a new flotation process for treating manganese ore at its Henderson, Nev., plant



The battery grade electrolytic manganese plant of Western Electrochemical Co.
went into full scale operation

Winnemucca, and Sam M. Robinson of Ely. Ely Valley Mines, Inc., produced some 2500 tons assaying between 14 and 24 percent Mn which were shipped to the Geneva Steel Co. and Combined Metals Reduction Co.

Pioche Mines Consolidated, operating in the Pioche area, shipped 3000 tons of 18-23 percent Mn ore to Geneva Steel, Western Electrochemical Co. and Combined Metals Reduction Co.

Elsewhere small shipments were made from the Aydelotte Mine, Cushman, Ark., and the Iron King at Kingston, N. M.

A new development was that of Western Electrochemical Co. of Henderson, Nev., which placed its battery grade electrolytic manganese plant into full scale operation. The current production of 10 tpd of gamma type manganese was allocated for military use.

The Union Manganese Co., and companies operated by R. Green Annan, conducted open pit operations at some half dozen properties in southwestern Virginia. Treatment consisted of log washers and also one electrostatic separation and sintering plant. Shipments under the carload lot program from all sources amounted to some 300,000 long ton units.

Haile Mines, Inc., was constructing a plant at the Lake Valley Mine located near Hillsboro, N. M., to upgrade by heavy media separation, 300 tpd of ore averaging 18 percent Mn. This plant was scheduled to go into operation in January, 1954.

Al Stovall and associates were very active in supplying ore to the Wenden Depot. A substantial production was obtained from various properties in the Artillery Peak District, and a 300-tpd jigging plant was built and placed in operation at the Van Doren property situated near Ludlow, Calif. This latter property is of particular interest because it is the first attempt to upgrade a low-grade (8-10 percent)

Mn ore. The 38 percent concentrate produced was shipped to the Wenden stockpile. The Bosley-Stovall interests shipped over \$70,000 worth of 41-48 percent ore from the Denison Mine at Long Valley, Ariz.

Test New Ores

Need to stimulate domestic production of low-grade ores contributed to the development of several new manganese producing processes, herein briefly described.

The E. S. Nossen Laboratories, Inc., of Paterson, N. J., after successful small scale pilot plant tests, entered

into a development contract with the Government to build, at a cost of \$500,000, a pilot plant treating 15 tpd or more of 10 percent manganese ore from Aroostook County, Me. The plant should be ready for operation in the early spring of 1954.

Mangaslag, Inc., was constructing at Pittston, Pa., a pilot plant to treat basic open hearth slags. The experimental furnace is designed to smelt some 400 tpd of slag containing about 7 percent Mn., with an anticipated 85 percent manganese recovery. This plant is scheduled to go into operation in early 1954.

Southwestern Engineering Co. of Los Angeles, Calif., continued to sample the principal deposits of wad ore and conducted analytical and beneficiation tests on representative ore samples, all in accordance with its contract with the Government.

The Boulder City Station of the U. S. Bureau of Mines continued experimental flotation on Artillery Peak lowgrade ore, and chemical treatment of this concentrate. Results of the tests still were inconclusive.

From the foregoing it may be seen that the over-all manganese industry embraces a three-fold approach; importation of foreign ores, domestic mining and research. We shall continue to rely rather heavily upon foreign sources for some time to come with the hope that domestic industry achievements will be accelerated in 1954.



There was a substantial increase in domestic manganese production

Magnesium

Industry Weathers Post-War Change-Over Period as Production Started to Climb in Third Quarter. Output Six Times the 1950 Figure

By JAMES S. KIRKPATRICK

President
The Magnesium Association

IN 1953, the magnesium industry again was faced with a major shift in its market. From the military establishment as primary buyer in a war economy, consumers and products essentially used for normal business demands became of top importance. This time the change-over was neither so sudden nor so complete as in 1945-46. At that time the pattern was to discontinue the manufacture of all items which even savored of defense. In doing that magnesium working and many similar industries were momentarily closed down. Present thinking is more realistic and those products which are necessary to maintaining the defenses of the country are still in demand though in limited quantities and with less immediate urgency.

The current "post-war" period found the magnesium industry better prepared than was the case in 1946. Most of those firms working in this lightest of all structural metals spent some effort in the past few years planning for this present slack period in defense demand. Items and appli-

cations geared to civilian markets are helping magnesium hold fast to the gains made and markets developed in the bitter days of the first post-war experience. The degree, to which it has been possible to hold this volume. percent of estimated total industry capacity. Better still, production has moved upward from the 1953 low of 6076 tons produced in September, for the third successive month.

From the production standpoint, 1953 was an excellent year for magnesium. True, total production was approximately 12 percent under the amazing 1952 total of 105,821 tons, but that year was the third highest in the history of the industry. Another interesting and enlightening comparison was to be found in the fact that 1953 output was about two and a half times 1951 production and six times the volume reached in 1950.

Industry Moves Forward

Most members of the industry considered this evidence of the effective value of the active technical and display program which has been carried on by the Magnesium Association for the past six or seven years. It was

U. S. Production of	Shipments Magnesium	Shipments Magnesium and
Primary Magnesium	Wrought Products	Magnesium-Alloy Castings
(In Short Tons)	(Thousands of Pounds)	(Thousands of Pounds)
1953 93,075 1952 105,833 1951 40,914 1950 15,726 1949 11,598 1948 10,003 1947 12,344 1946 5,317 1945 32,792 1944 157,100 1943 183,584 1942 48,963	1953 18,158* 1952 18,430 1951 19,090 1950 12,810 1949 8,264 1948 5,865	1953 34,106° 1952 34,857 1951 30,825 1950 15,224 1949 11,053 1948 8,214 1947 7,691 1946 8,472 1945 83,753

* Estimated.

is best evidenced in the fact that during the last month of 1953—with all but one government plant out of production—total primary ingot production was 6467 short tons, nearly 60

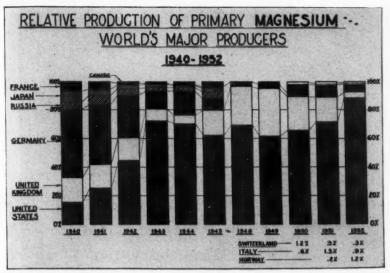
tangible evidence that industry generally was moving forward by utilizing in part at least the technology being developed and disseminated on behalf of the industry by its Association. It was solid evidence that the inherent values present in magnesium were being understood and utilized to a degree which assured future markets if the technology was backed by selling effort.

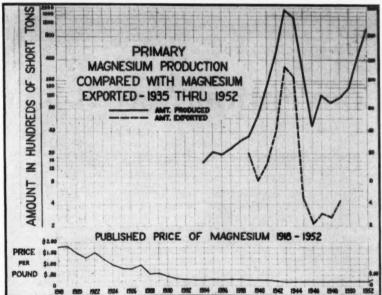
As a part of the program mentioned above, in 1953 the Magnesium Association sponsored four technical meetings and a major international exhibition in Washington, D. C. The latter, with active cooperation and participation by the Armed Forces, fixed attention of the public on the multiplicity of uses of this versatile metal. But more than that was achieved. Designers and engineers, for the first time, saw in one place evidence of the extent to which the engineering characteristics of magnesium were being used. This was in contrast to considering as its sole value the lightness, which had been its primary claim in seeking acceptance and use.

Shipments Hold Firm

The factual basis for these observations can be seen in the statistics of

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the industry. According to figures issued by the Federal Government, shipments of castings and of wrought products held at or near the 1952 levels despite the loss of large defense orders in the last half of the year. In the case of neither castings nor wrought products was there a critical drop in shipments although it is true that there were evidences of a changeover period at a lower level while new business was taking its place on production books.

Major developments in the field of supply were two. First, and as mentioned before, all government-owned production facilities except the Valasco, Tex., plant operated in conjunction with the Freeport plant of Dow Chemical Co. have been withdrawn from operation. Secondly, during the year

Dow brought nearer to completion the concentration of its magnesium processing and fabricating facilities at Madison, Ill.

Wrought Products Set Pace

Indications are that developments in wrought magnesium products will set the pace for the industry in the year ahead as more sheet and extruded product becomes available and as skills in working these products increase. However, if the current trend to ever-widening applications of magnesium castings produced by all of the varied casting techniques continues, they too, should show increased tonnage in the year ahead.

Patterns of uses by industry of magnesium have undergone little change in the past year. Aviation

and the aluminum industry continue to be major users of the product with materials handling and the various phases of ground transportation currently developing fastest. However, there is every reason to believe that increases in product demand will evidence extended, as well as new, areas of use in 1954. Possibly the graphic arts provide the most promising future market for the product, though the tonnage used may never become very large. New developments have recently been announced by Dow and it is known that others, still in the experimental stages, give great promise of new techniques in an industry which has seen few basic changes in its long history.

Fundamentally price has had little influence on the industry in the year just closed. A minor upward revision of about 10 percent had little effect for it only reflected general price increases.

Supply Unlimited

Magnesium finds itself in an enviable position insofar as supply is concerned. It has, as a selling point, unlimited and assured supply. So long as there is sea water there is magnesium-6,000,000 tons in each cubic This fact alone is heartening, but when it is considered with the projected increment of use indicated in the President's Materials Policy Commission report, 1845 percent increase by 1975, those working in magnesium know there is still no need to worry. As a matter of fact consideration of these figures stimulates a warm glow in anticipation of a rosy future. One which will reward constructive selling efforts, coordinated with intelligent product engineering and applications which are fundamentally sound.

Data from which all that has been said stems is seen in the production figures appended. Intensive study of production curves will serve to accent the fact that American industry is coming rapidly to a sound evaluation of the attributes of the world's lightest structural metal.





All coal mining men are heading for Cincinnati

1954 Coal Convention May 3-5

All Signs Point to an Outstanding Meeting

CINCINNATI, Ohio, will again be the mecca of the coal industry May 3-5, on the occasion of the American Mining Congress 1954 Coal Convention. Here industry representatives from all parts of the country will congregate to learn what is new, to get a look at the future, and to enjoy themselves. The importance of these meetings is recognized by mining men outside of the coal industry too, as they look with respect at the high degree of mechanization in our coal mines. Each convention is attracting more and more people from the metal and nonmetallic mining fields.

Balanced Program

Right now coal is in a situation where it is vital to cut mining costs and increase efficiency. The convention program is studded with names of well-known mining men who will tell and show how their particular companies are working toward this goal. All phases of mining will be thoroughly covered. Improvements in standard mining methods and equipment will receive equal emphasis with new tools and developments. The committee has done an outstanding

job in balancing the program to include topics of direct application to all segments and geographical areas of the industry.

The position of atomic energy as future competition to coal has been prominent in the minds of many mining men. A luncheon has been arranged at which this topic will be thoroughly discussed by Walker L. Cisler, president of the Detroit Edison Company-which is one of a group of private companies now investigating the commercial application of the atom. Another luncheon will be addressed by a man of outstanding prominence in the present Government in Washington. These two features alone would make attendance at the convention worthwhile.

Entertainment Will Be Tops

The traditional Coal Miners Party will be held Monday evening with a great time to be had by all. It has been planned to fully satisfy the wellknown appetite for fun and frolic of miners and their ladies.

Major league baseball will be the big attraction on Tuesday night. A special American Mining Congress section has been set aside at Crosley Field, where the Cincinnati Reds and the New York Giants will square off in a game under the lights. Tickets are available from the Cincinnati Baseball Club Co., 307 Vine St., Cincinnati, Ohio. Don't forget to mention that you want to be seated in the special Mining Congress section of the grandstand. For those who prefer, the evening will be free for getting together with old and new friends.

The biennial Coal Banquet will climax the convention on Wednesday evening. The banquet will again be "speechless," with only brief introductions of honored guests. Topnotch talent will provide entertainment in the renowned and exciting tradition set by the Wayne King and Victor Herbert shows of recent years.

It is plain to see that the convention will be outstanding, not only on the business side but from the entertainment standpoint too. A special program is being arranged for the ladies, and a large number are expected.

Room reservations are to be made directly with Cincinnati's hotels. Those planning to attend should ask for reservations at once. The Cincinnati Convention and Visitors Bureau, Inc., Union Central Bldg., Cincinnati, Ohio, (Telephone: Parkway 3728) will assist in securing accommodations if desired.

Preliminary Program:

MONDAY, MAY 3

10:00 am-Opening Session

What's Ahead for Coal?

EUGENE AYRES, Gulf Research & Dev. Co.

The Federal Coal Mine Safety Board of Review
A Panel Discussion by the Board Members
EDWARD STEIDLE, Board Chairman
TROY L. BACK, Executive Secretary
JOHN S. FORSYTH, General Counsel
EDWIN R. PRICE, Inland Steel Co.
CHARLES B. FERGUSON, United Mine Workers

12:15 pm—Luncheon

Guest speaker to be announced.

2:15 pm-Roof Support Session

Rotary Drilling in Sand Rock for Roof Bolting J. K. BERRY, Clinchfield Coal Corp.

Pneumatic Drilling for Roof Bolting
MARTIN VALERI, Buckeye Coal Co.

Yielding Member Steel Ring Roof Supports
C. S. KUEBLER, Lehigh Navigation Coal Co.

Pillar Extraction—Methods, Results, Recovery
GEORGE L. JUDY, Consolidation Coal Co. (W. Va.)

2:15 pm—Strip Mining Session

Truck Haulage Problems—Engines, Tires, Roads ANDREW HYSLOP, Hanna Coal Co.

Anthracite Stripping in Burning Areas

JOHN DAVIES, Shen-Penn Production Co.

Auger Mining on High Walls
KENNETH O. SHANER, Mech Mining Co.
D. A. ZEGEER, Consolidation Coal Co. (Ky.)

TUESDAY, MAY 4

10:00 am-Mechanical Mining Session

Face Preparation Methods—A Symposium

In Thick Seams

D. C. Howe, Vesta Shannopin Div., Jones & Laughlin Steel Corp.

In Thin Seams
Speaker to be announced.

In Pitching Veins

ROBERT YOURSTON, Union Pacific Coal Co.

Efficiency of Large vs. Small Crews for Mechanical Mining— A Symposium

HENRY W. BAUER, West Va. Coal & Coke Corp. Joe Craggs, Peabody Coal Co.

G. S. JENKINS, Clarkson Mfg. Co.

10:00 am-Coal Preparation Session

Effect of Future Markets on Coal Preparation
J. B. Morrow, Alford, Morrow & Associates

Coal Preparation at Midwest Radiant Co.
I. V. CURTIS, Midwest Radiant Co.

Heavy Media Cleaning

A. E. SADLER and J. W. FOREMAN, Pocahontas Fuel Co., Inc.

D. C. SNYDER, Mt. Hope Coal Co.

Developments in Feldspar Jigging

Dr. H. F. YANCEY, Fuels Technology Div., U. S. Bureau of Mines

12:15 pm-Luncheon

Address: "Atomic Energy and Its Industrial Applications" WALKER L. CISLER, The Detroit Edison Co.

2:15 pm—Haulage Session

Underground Belt Conveyor Maintenance
R. U. JACKSON, Hewitt-Robins Incorporated

Shuttle Car Haulage to Mine Cars
THURMAN C. HARRIS, JR., Ingle Coal Corp.

Shuttle Car Belt Loading in Thin Seams
C. H. WILLIAMS, Red Jacket Coal Corp.

Extensible Belt Conveyor for Continuous Mining
W. J. SHIELDS, Rochester & Pittsburgh Coal Co.

2:15 pm—Strip Mining Session

Bigger Returns from Larger Stripping Equipment
THOMAS M. WARE, International Minerals &
Chem. Corp.

Recent Information on Blasting Vibrations

JULES E. JENKINS, Vibration Measurement
Engineers

Strip Mine Haulage

ROBERT UHL, W. G. Duncan Coal Co.

WEDNESDAY, MAY 5

10:00 am-Maintenance and Power Session

Maintenance Organization and Practices at Hudson Coal Co.

DONALD SMITH, Hudson Coal Co.

Underground Installation of High Voltage Cables
JOHN A. DUNN, Island Creek Coal Co.
T. R. WEICHEL, Hazard Insulated Wire Works of
The Okonite Co.

Mine Illumination—The BCR Underground Experiments GERALD VON STROH, Bituminous Coal Research

10:00 am-Coal Preparation Session

Reject Disposal by Truck, Pumping, and Belt Conveying W. A. WEIMER, Northern Illinois Coal Corp.

Utilization and Recovery of Washery Wastes Speaker to be announced.

Recent Developments in Eliminating Stream Pollution
HENRY F. HEBLEY, Pittsburgh Consolidation
Coal Co.

2:00 pm—Continuous Mining Session

Continuous Mining Operations—A Symposium

Goodman Miner

J. W. McDonald, Old Ben Coal Corp.

Jeffrey Colmol

E. M. PACE, Inland Steel Co.

Joy Continuous Miner

RICHARD GRAHAM, Saginaw Dock & Terminal Co.

Konnerth Mining Machine

RALPH C. BEERBOWER, JR., Coal Div., U. S. Steel Corp.

Lee-Norse Minor

C. B. TILLSON, JR., Crucible Steel Co. of America

Marietta Miner

F. R. ZACHAR, Christopher Coal Co.

Continuous Mining in Steeply Pitching Seams Speaker to be announced.

Two Years' Experience in Longface Mining
W. D. HAWLEY, Eastern Gas & Fuel Associates
RICHARD T. TODHUNTER, Barnes & Tucker Co.



Wheels of GOVERNMENT



As Viewed by HARRY L. MOFFETT of the American Mining Congress

THE Administration's "dynamic" program for a stronger America was unveiled on January 7 when President Eisenhower went before a joint session of Congress and called for enactment of a sizable list of legislative proposals, many of which would reduce Federal activities and place more reliance upon private initiative.

The President called upon the lawmakers for legislation continuing foreign military aid and technical assistance but said that foreign economic aid could be sharply reduced. He urged Congress to enact proposals which would authorize construction of the St. Lawrence Seaway; widen the scope of the Social Security program; extend the Renegotiation Act; revise the Taft-Hartley Act; broaden flood control, housing, and health pro-grams; adjust postal rates; clear the way for statehood for Hawaii and suffrage for the District of Columbia; and permit eighteen year-olds to vote. He told the legislators that he would send up special messages on the labor law, social security, farm program, taxation and budget, health, housing, foreign trade, and public works. He also stated that from time to time he would submit requests for a uniform water resources policy, a revised public lands policy, and a program for safeguarding domestic production of critical and strategic metals and minerals.

In quick order during January he sent messages to Congress on revision of the Taft-Hartley Act, a new farm program, expansion of social security, a health insurance program, a budget for the next year and some 25 tax recommendations, a revamped housing program, and the economic report.

With the submission of these proposals from the White House, the Second Session of the 83rd Congress immediately kicked off a drive to give them as quick consideration as possible in order to adjourn early this summer in time to campaign for the November elections.

Federal Budget Slashed

The Federal Budget for the fiscal year 1955, submitted by President Eisenhower on January 21, is the lowest in many years, calling for total expenditures of \$65.6 billion, some \$12½ billion below the last one submitted by former President Truman. In sending the budget to Congress, the President also forecast the smallest budget deficit since 1949.

The budget, which some Capitol Hill leaders say may be cut another \$3 billion, continues last year's progress in reducing requests for appropriations and Government expenditures, the President declared. He said it justifies the tax reductions which took effect January 1 (about 10 percent in personal income tax rates and elimination of the excess profits levy) and further tax revisions which he proposed.

Outlays for major national security programs, including stockpiling and atomic energy programs, were estimated at \$44.9 billion, nearly \$4 billion less than in the current fiscal year. The President said that stockpile expenditures will be less than in the current year as a result of "approaching fulfillment of stockpile requirements in certain categories and of lower world market prices for materials still required."

The President renewed his request to Congress to hike the national debt limit

The proposed budget includes requests for \$27.3 million for the U. S. Geological Survey, \$20 million for the U. S. Bureau of Mines, and \$15 million for the Bureau of Land Management. For the current year the Geological Survey received \$27.7 million and the Bureau of Mines \$22.7 million.

Tax Revisions Recommended

As a part of his budget message, the President made some 25 recommendations for tax revision, which he said were the result of close collaboration between Treasury and Congressional staffs over the past year.

His program includes many proposals designed to reduce inequities in the taxation of individuals and several proposals to cut restraints on production and economic growth. He called for such changes as (1) a start in the direction of removing the double taxation of dividends, (2) liberalized tax treatment for depreciation, (3) permission for companies to

Washington Highlights

BUDGET: Cut sharply.

TAXES: Revisions proposed.

T-H ACT: Hearings under way.

TRADE PACTS: Lower tariffs con-

SEAWAY: Passes Senate.

SYNTHETIC FUELS: Federal program reduced.

STOCKPILING: Step up purchases.
MINERAL HEARINGS: Extended.

COAL SAFETY BOARD: Quicker appeals.

either capitalize or write off currently their expenses for research and development, (4) a requirement that the Government assume the burden of proof that accumulation of earnings is unreasonable, (5) simplification of taxation of partnerships and companies with a small number of stockholders, (6) revision of the law to permit loss carry-overs to be carried back two years and carried forward five years, (7) a start towards smoothing out corporation income tax payments by requiring advance payments in September and December before the end of the taxable year, and (8) further general simplifications of the law with respect to the estate and gift taxes and the administration of excise taxes.

The President said that further study is required in many other situations before recommendations can be sent Congress for tax revision. These subjects, he said, include tax treatment of capital gains and losses, of cooperatives and partially tax-exempt organizations and "the special problems of the oil and mining industries."

The President stated: "I do not believe that the budgetary situation justifies any tax reductions beyond those involved in the proposed tax revision and in the tax changes which occurred on January 1. Accordingly, I repeat my recommendation of last

May that the reduction in the general corporate income tax rate be deferred for another year. . . . I recommend that the excise taxes scheduled to be reduced on April 1, including those on liquor, tobacco, automobiles, and gasoline, be continued at present rates; and that any adjustments in the other excise taxes be such as to maintain the total yield which we are now receiving from this source."

The recommendations contained in the President's tax program are currently being considered behind closed doors by the Ways and Means Committee. That committee has already approved many changes affecting taxation of both individuals and corporations.

Some of the tentatively approved proposals affecting the individual tax-payer would (1) provide more liberal tax treatment of certain dependents earning over \$600; (2) provide split-income tax treatment for single persons who have dependents; (3) allow as a deduction expenditures for child care where working mothers furnish the principal family support; (4) allow more liberal tax treatment of medical deductions; and (5) move the March 15 filing date for individual tax returns up to April 15.

The committee has also approved several proposals intended to reduce the more serious restraints on business. Some of these proposals which are similar to the President's recommendations would: (1) Take a step toward elimination of double taxation of dividends; (2) provide more liberal depreciation deductions; and (3) provide a two-year instead of the present one-year carry-back for net operating losses while retaining the present five-year carry-forward provision. The committee has turned down a proposal to increase the individual income exemption from \$600 to \$700. This is expected to be the subject of a floor fight by opponents of the President's program.

The work of the committee is expected to continue for several weeks.

T-H Proposals Sifted

On January 11, the President sent Congress recommendations for 14 amendments to the Taft-Hartley Act. He said that the labor law is sound legislation which reaffirmed and reinforced the right of working men and women to organize into unions and to bargain collectively with their employers. He also declared that this should remain a permanent policy of the Government. His recommendations were considerably changed from those proposed by former Labor Secretary Durkin and which were embodied in a White House "draft" late last session.

The President called for revisions of the law which would (1) provide that where NLRB injunctions are issued a special local board be empanelled by the Federal Mediation and

Conciliation Service to try to obtain a settlement of the dispute, (2) modify secondary boycott restrictions, (3) protect economic strikers in representation elections, (4) restrict the reopening of collective bargaining agreements to cases where the contract authorizes reopening or where the parties mutually agree to reopening, (5) empower the President to call upon emergency fact-finding boards for recommendations for settlement of national emergency strikes, such recommendations not to be binding on the parties, (6) permit prehiring agreements, including a sevenday union shop provision in the construction, maritime or amusement industries, (7) extend the non-Communist affidavit requirement to management, (8) extend the "free speech" provision to management, (9) provide that common law rules as to agency apply to both unions and employers, (10) authorize study of welfare and pension funds under collective bargaining agreements, as a basis for later legislation to protect these funds for employes, (11) clarify the jurisdiction of the State and Federal Governments over emergencies dealing with the health or safety of citizens. (12) provide for secret strike ballots under Government supervision, (13) permit the check-off of union dues as authorized by an employe to run for the life of a contract unless revoked by the employe, and (14) simplify union reports dealing with their organization and finances.

Following Congressional reception of the message, Senator H. Alexander Smith (Rep., N. J.), chairman of the Senate Labor Committee, introduced a bill to carry out the President's recommendations. The Senate Labor Committee opened hearings on the bill on January 25. Mining industry witnesses were scheduled to testify early in February. Administration spokesmen headed by Labor Secretary James P. Mitchell went down the line for the President's recommendations.

Meanwhile, House Speaker Joe Martin (Rep., Mass.) predicted that the House would pass a Taft-Hartley revision measure at this session. Chairman McConnell (Rep., Pa.) of the House Labor Committee indicated that it would be late March before that committee would report out a revision measure.

Most Capitol Hill observers are of the opinion that if changes are made in the Taft-Hartley Act they will be of a minor nature.

Randall Commission Split

The Randall Commission at long last came up with its report on foreign trade and economic policies but dissents by leading members of Congress made it highly improbable that many, if any, of its proposals would be enacted into law this year.

President Eisenhower shied away from a blanket endorsement of the long-awaited report's recommendations, which included one urging the extension of the Reciprocal Trade



"I'm so glad-that'll take his mind off the mine for a while"

Agreements Act for another three years. The President merely said that the report would provide the basis for an Administration program that will advance "the best interests both of the United States and of the free world." He sent the report to the State Department and other interested agencies for formulation of a trade policy that can be submitted to Congress later in this session.

Chairman Dan Reed (Rep., N. Y.) of the House Ways and Means Committee and Rep. Richard Simpson, a senior member of the same committee, sharply protested the report and said that they would present an alternative program. Chairman Eugene Millikin (Rep., Colo.) of the Senate Finance Committee said the report blithely ignored the effect that proposed tariff cuts would have on Federal income.

He declared that "the experiences of two World Wars would sufficiently argue the point that our main dependence should rest wherever possible upon domestically produced materials." He challenged the emphasis placed in the report upon financing foreign sources by pointing out the "need for domestic investment for the development of domestic sources and for Governmental policies at home which would give opportunity for a profitable return on such investment."

"The notion that we can conserve our domestic materials for emergency use is fallacious," contended Millikin. "Anyone who knows anything about the mining industry knows that the work of exploration and development can never stand still." He also stated that the best protection is not excessive stockpiling but "rather a growing domestic industry which can supply most of our wartime needs."

Major recommendations of the Randall Commission called for broad authority for the President to cut tariffs 15 percent over the next three years, continuation of foreign economic aid, preferential tax treatment for private investments abroad, simplification of tariff and customs classifications and regulations, waiving of the "Buy American" Act as to countries giving U. S. sellers equal treatment, extension of standby credit by the Federal Reserve System to central banks of other countries to achieve general convertibility of currency, and U. S. acquiescence in more trade in peacetime goods between Western Europe and Russia and her European satellites.

Seaway Faces Hurdle

For the first time in its long and controversial history the St. Lawrence Seaway received the approval of the United States Senate. But despite the two to one favorable vote by which it was approved in the upper chamber in mid-January, the authorization for the project faces tough sledding in the House.

Heavy opposition on the part of many members of the House Public Works Committee, coupled with the fact that the measure must also get floor clearance from the powerful House Rules Committee, places stumbling blocks in the way of House action on the controversial measure. It is expected that pressure from the Administration and from its leaders in the lower body may get the bill to the House floor this session but it is at this point that a bitter battle will be fought.

It is understood that there is a possibility that powerful delegations from some of the eastern states will try to line up with a few western and southern delegations to defeat the measure on the floor.

Proponents of the measure in the House are gloomy as to its prospects. Many feel, however, that if the President swings his personal weight in this battle the House will go along with the Senate and authorize the United States to participate jointly with Canada in the construction of the seaway.

Synthetic Fuel Policy Changed

Secretary of the Interior McKay has announced that the Government will discontinue its effort to develop a commercial synthetic liquid fuels industry in this country.

McKay announced a sharply reduced program "which will emphasize fundamental laboratory and pilotplant research on producing liquid fuels from coal and oil shale," leaving commercial development to private industry.

In outlining the new policy, McKay said he has decided not to request extension of the Synthetic Liquid Fuels Act, due to expire in April, 1955, and to rely on the organic legislation establishing the Bureau of Mines, which "appears to contain ample authorization for the studies contemplated."

The Secretary said the Government will follow these specific procedures for research:

"Coal to oil research—work is to be continued on direct hydrogenation of coal and on the synthesis of liquid fuels from gasified coal within the Bureau's laboratory facilities.

"Coal gasification — laboratory research and pilot plant runs will be continued.

"Oil shale—no further large-scale mining development will be undertaken. Laboratory research on oil shale will be continued and the retorting of oil shale at Rifle, Colo., will continue until the practicability of the Bureau's new retorting equipment has been demonstrated."

McKay stated that the coal hydrogenation demonstration work conducted at the Louisiana, Mo., ordnance plant "had successfully proved that

its basic research was sound. It had, however, reached the point of diminishing return and was costing the Federal Government \$10,000 a day to operate."

He added that the Government could spend another \$80 million in the next 10 years on research and not prove anything that private industry cannot do quicker and at less cost. "In suspending the work at Louisiana," McKay said, "we not only saved a considerable sum, but in offering the results of our research to private industry, we are closer to the basic concept of the Federal Government's relationship to the people."

Speed Stockpile Purchases

ODM Director Arthur Flemming recently announced a program to speed up purchases for the national stockpile, and gave the green light to the General Services Administration to purchase quantities of all items on the stockpile list for which goals have not already been achieved or substantially contracted.

Under the accelerated program, deliveries for the stockpile are to be limited to one year plus lead time after the date of purchase, except where it is advantageous to accept delivery over a longer period. Prior to purchase of materials, consideration and preference is to be given to materials to be acquired under the terms of the Defense Production Act and to the possible beneficiation and addition to the stockpile of currently-held subspecification materials.

Under the program the following materials are to be procured: Aluminum, asbestos, beryl, metallurgical and refractory grade chromite, cobalt, columbite, copper, manganese, mercury, mica, molybdenum, nickel, platinum, selenium, tantalite, and zinc. Only minor amounts of some of these materials are sought since stockpile goals for them are virtually achieved.

Mining Hearings Extended

The Senate Interior Subcommittee, headed by Senator Malone (Rep., Nev.), is nearing completion of its investigation of the Western Hemisphere's degree of self-sufficiency in strategic materials in event of war. The committee's report and recommendations were previously scheduled to be made to the Senate by January 31, but Senator Butler successfully sponsored a resolution extending the time for this action until April 30.

During the course of hearings last month, Andrew Fletcher, president, St. Joseph Lead Co., told the committee that domestic lead and zinc production will suffer a very serious further drop in the next six months if producers are not afforded relief from excessive imports. He advocated suitable tariff protection to place domes-

(Continued on page 136)



Blaine S. Smith retired December 31, 1953, as president of Universal Atlas Cement Co., a subsidiary of United States Steel Corp. He was succeeded by Charles B. Baker, executive vice-president. Smith, who had



Blaine S. Smith

been associated with Universal Atlas for more than 37 years, continues with the company in a consulting capacity.

Baker joined the cement company in 1942, becoming secretary the following year and general at-

torney in 1945. He was elected a director in 1944 and in 1949 was appointed assistant to the president. He

was elected vicepresident and general attorney in 1951 and executive vicepresident in July, 1953.

Smith began his business career as a railroad man but joined the Universal Portland Cement Co. in 1908, serving as



C. B. Baker

general sales manager, director and vice-president. From 1928 to 1936 he was president of the Penn-Dixie Cement Corp. in New York, returning to Universal Atlas as president and director in 1936.

H. W. Straley, III, geologist and geophysicist, Princeton, W. Va., is currently engaged in electrical and magnetic investigations of iron deposits in northern Georgia.

Consolidation Coal Co. (Ky.), Division of Pittsburgh Consolidation Coal Co., has announced the appointment of David A. Zegeer as assistant to the president, G. O. Tarleton. Zegeer began work for Consol at Jenkins, Ky., in 1946 and has had experience as rodman, transitman, draftsman, mining engineer, section foreman, as-

sistant superintendent and project engineer before his recent appointment.

Appointment of R. R. Williams, Jr., to a newly created position as assistant manager of the Colorado Fuel and Iron mining department was announced by George H. Rupp, manager of mines for the corporation. Williams, superintendent of blast furnaces at the Pueblo plant of CF&I for the past six years, assumed his new responsibilities December 1. He will work closely with Rupp, who has guided the rapidly expanding mining department of CF&I since 1929.

Moss Patterson has been elected a vice-president of West Kentucky Coal Co., according to company president Hooper Love. Patterson's duties as a production engineer will remain unchanged and he will continue to have general supervision of all mining and related activities.

Howard Lee Young has been appointed manager of Metal and Acid Sales of the American Zinc Sales Co., distributors for American Zinc, Lead and Smelting Co., effective January 1, 1954, with offices at 1515 Paul Brown Bldg., St. Louis, Mo.

T. R. Workman, at his request, has retired from his duties as vice-president for operations of West Virginia Coal & Coke Corp. and has assumed the duties of public relations director, a newly created position.

Henry W. Bauer, who has been associated with the Operating Department of the company for many years, has been appointed division manager of the company's operations in Logan County, W. Va.

James S. Westwater recently was named manager of Michigan mines for the Cleveland-Cliffs Iron Co.'s Michigan iron mining operations, replacing F. J. Haller, who resigned to take a post as vice-president of the North Range Mining Co. Hugo H. Korpinen, formerly superintendent of the firm's Mather mine, was promoted to district superintendent of Michigan underground mines, and Harry C. Swanson, superintendent of the Republic and Humboldt mines, was named district superintendent of Michigan open pit mines.

A. O. Bartell has resigned as managing engineer for Raw Materials Survey to devote his time to consulting work. The Survey is a private research organization located in Portland, Ore.

The election of George J. Clark as vice-president in charge of operations of the Philadelphia and Reading Coal and Iron Co. has been announced by Edward G. Fox, president. Clark succeeds the late George A. Roos.

Clark will combine the duties of his



new post with those of his present office of general manager and will remain at the company's Pottsville offices.

The newlyelected P&R executive joined the company in 1933. He was appointed divi-

sion engineer of the Pottsville Division in 1943. In 1946, when the company organized the Shen-Penn Production Co., Clark was appointed its chief engineer. The following year he became president of the P&R subsidiary. In 1951 he returned to Philadelphia & Reading as general manager.

Robert P. Koenig, president of Cerro de Pasco Corp., has announced two recent appointments in the company. William B. Devlin is controller of the corporation, succeeding Frederick W. Holshuher, who has resigned.

Devlin formerly was assistant treasurer and assistant secretary of Calu-

met & Hecla, Inc., and controller of its Calumet Division at Calumet, Mich.

Horace W. Higgs is assistant general superintendent of smelting and refining of the corporation. He will continue to be stationed at



H. W. Higgs

La Oroya, Peru, where the corporation's smelting and refining plants are located.

Higgs became associated with Cerro de Pasco in 1949 as superintendent of lead smelting, which position he held until his present appointment. Prior to 1949 he was employed for several years by American Smelting & Refining Co. at its East Helena lead smelter as metallurgist and in other supervisory capacities.

Higgs succeeds J. M. Mortimer, who resigned to return to Canada.

Governor Goodwin J. Knight announced the appointment of Lewis L.



L. L. Huelsdonk veras Cement Co.

Huelsdonk, secretary-treasurer and general manager of Best Mines Co., Inc., as a member of the California State Mining Board to fill the vacancy created by the January 15 term expiration of W. Wallace Mein, president of Cala-

W. F. Shinners was recently appointed general superintendent in charge of Michigan mines for the M. A. Hanna Co. He had been district superintendent of the Iron Mountain mine in Iron Mountain. Mo.

Floyd H. Lee, who has been mining engineer at Iron Mountain, will succeed Shinners as district superintendent of Iron Mountain.

Herman E. Knight has been appointed general superintendent of the Kentucky properties of Bell & Zoller Coal Co.

J. Parnell Caulfield, general manager, western mining divisions, Kennecott Copper Corp., has been named



J. P. Caulfield

president of the Utah Mining Association, succeeding Cecil Fitch, Jr., vice-president and general manager, Chief Consolidated Mining Co. Otto Herres, vice-president of Combined Metals Reduction Co., was named first vice-president

L. F. Pett, general manager, Utah Copper Division, Kennecott Copper Corp., was named second vice-presi-



Otto Herres



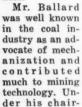
L. F. Pett

dent. Re-elected to office were A. G. MacKenzie, vice-president and consultant; Miles P. Romney, secretary-manager, and Walter M. Horne, assistant secretary-manager.

A. E. Mullin, 88, mining engineer, died in Joplin, Mo., December 1. Born in Mound City, Kans., Mr. Mullin had been a resident of Oronogo and Joplin, Mo., for the last 86 years. He was employed as a mining engineer by the Granby Mining and Smelting Co. and the American Lead, Zinc and Smelting Co. before retiring in 1941.

C. C. Ballard, superintendent, Power and Mechanical Department, the New River Co., died at his home in Beckley,

W. Va., on January 23 following a brief illness.



manship, the American Mining Congress Committee on Underground Power conducted many studies that have had lasting effect on the art of mining coal.

Walter B. Templeton, 81, founder and formerly chairman of the board of Templeton, Kenly & Co., Broadview, Ill., manufacturers of Simplex mechanical and hydraulic jacks, died at Hinsdale, Ill., December 6.

Russell H. Wilmot, superintendent for Truax-Traer Coal Co. at Ceredo, W. Va., died on November 16.

Edward M. Flynn, who was colliery and division superintendent for Hudson Coal Co., died in late November following a heart attack. Mr. Flynn was superintendent of Gravity Slope Colliery in 1917; Baltimore Colliery, in 1923, and the Loree Division of Hudson, the company's largest division, in 1925.

George S. Baton, 84, mining engineer and coal consultant, died in Pittsburgh December 28. A partner in George S. Baton & Co., consulting engineers, Mr. Baton was also chairman of the board of directors of the Greensburg-Connellsville Coal & Coke Co. and the Baton Coal Co., operating five mines in Pennsylvania, West Virginia and Ohio.

Walter I. Garms, 67, died of a heart attack on December 29, 1953, at his residence in San Mateo, Calif. Prior to his retirement in 1951, he was assistant general manager of Ray Mines Division of Kennecott Copper Corp., and in direct charge of its reduction plant at Hayden, Ariz.

He was born and raised in San

Francisco, and after graduating from the University of California in 1910 he entered the employ of the Ray Consolidated Copper Co., the predecessor of Kennecott's Ray Mines Division. He first worked at the mine for a few months and then transferred to the milling department at Hayden, where (except for two years of military service in World War I) he remained until his retirement, working his way up through the mill organization to general mill foreman in 1915, mill superintendent in 1926 and assistant general manager of Ray Mines Division in 1945.

Ernest Iselin, 77, chairman of the board of Rochester and Pittsburgh Coal Co., died January 10 at his home in New York. Mr. Iselin was a director of many corporations and a prominent philanthropist.

In late November, D. H. Pape, 69, until his retirement president of the Sheridan-Wyoming Coal Co., passed



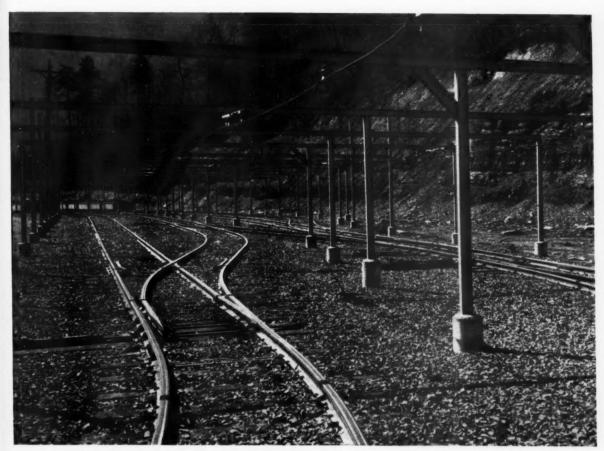
away in Santa Monica, Calif. Mr. Pape was a well-known figure in the coal industry for many years and was officially connected with operations in Utah, West Virginia and Wyoming.

During his long career he served the industry as assistant executive secretary, later director, of the National Coal Association; director, Rocky Mountain Coal Mining Institute, and at one time was chairman of the Rocky Mountain Division, American Mining Congress.

M. E. Volin, Chief of the U. S. Bureau of Mines' Region II Mining Division, has been promoted to director of Region V.

William Davis, 76, died in Lexington, Ky., November 1. Mr. Davis was president of the old King Mining Co. and the Kentucky Sun Coal Co. and vice-president of Midland Mining Co.

William R. Allen, 82, died recently in Butte, Mont. Mr. Allen went into mining in 1898 when he built one of the first gold dredges in Montana at French Gulch. At one time he was president of the Butte-Anaconda Consolidated and Milling Co., chairman of the Board of Directors of the Bostona Mines Co. and first vice-president of the Mining Association of Montana. From 1909 to 1913 he was lieutenant governor of Montana, serving part of that time as governor.



no jiggles, no bumps no coal spillage here

track. Even in the photograph, many of its features are readily apparent. Features like the well-aligned straightaways and perfectly-curved turnouts. But there's something else we'd like to point out.

That's the absence of coal along the track. See any spillage? There's hardly a chunk on the ground. None of those messy, dirty piles that so often litter the haulageways of many mines.

The loads are big, and the coal rides high. But it's still in the cars at the end of the trip—because the track is smooth, well made, well laid. Joints are trim and neat. Rails, both straight and curved, are free of ripples. Frogs are well machined, switch points carefully planed. There are no bumps, no jiggles, when trains run over this Bethlehem track. The coal stays where it belongs—in the cars.

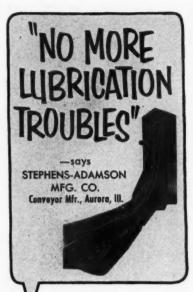
It is now possible for any mine, regardless of size, to have equally good haulageways. If you are considering changes in yours, we suggest you consult with a Bethlehem engineer. He will be glad to study your mine and show you how Bethlehem prefabricated track can do a real job; how it can lead to smoother, faster, safer haulage.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM PREFABRICATED TRACK





"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

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Wheels of Government

(Continued from page 132)

tic producers in a competitive position with foreign producers.

Two retired generals also called for stronger domestic mining industries. They were Lt. Gen. Albert C. Wedemeyer, former Army Deputy Chief of Staff, and Brig. Gen. Bonner Fellers, former Army intelligence expert. Wedemeyer expressed the opinion of both when he said that it is unsound for a nation to depend upon sources of raw materials that are remote from that nation's industrial center because air attack would make transport lanes "highly vulnerable." He advocated development of production of strategic metals and minerals in the United States first, and in the rest of the Western Hemisphere next.

Governor Robert F. Kennon of Louisiana told the committee that importers should bear their fair share of maintaining the American market.

The Governor pointed out that when production comes from the ground, it must be "sought after, then found, then persuaded out of the ground with modern machinery and modern methods involving the employment of a great many men."

He stated "it would be only equitable that imported oil or imported metals or imported goods of any sort that are coming to this good industrial atmosphere to supply the American market should pay their share of the costs, both the industrial and private costs, and particularly the Government costs that make this fine market area available."

Safety Board Rules Eased

The Federal Coal Mine Safety Board of Review has amended its regulations to allow easier and quicker access to the Board by operators in states which have approved state plans. Present law provides that an operator in a state having a state plan may not appeal to the Director of the Bureau of Mines from a closing order, but rather must appeal such closing order directly to the Safety Board of Review. Prior to this amendment, the operator, in order to reopen his mine and obtain action on his appeal, was required to appear at a formal hearing of the Board even though the cause for closing his mine had been abated.

Under the amended rules, in a situation where there is no disagreement between the Bureau and the operator, the Board will be permitted to act on an application for annulment or revision of a closing order without a formal hearing or the presence of the operator if the Bureau certifies that the violation has been abated and joins with the operator in requesting the annulment or revision order.



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Eastern and Central states

Island Creek 1904-1954

Island Creek Coal Co. celebrates its 50th anniversary this year.

In 1904, Albert F. Holden and William H. Coolidge, both corporate officers of the United States Oil Co. which later became the Island Creek Coal Co., acquired 28,000 acres of coal land in the rugged areas of Logan County in southern West Virginia. The town of Holden was founded as the center of operations. Machinery and other necessities were hauled in by ox team even before rail facilities were extended to Holden. In December, 1904, railroad service was initiated and the company sold and shipped the first of the more than 273,000,000 tons it was to sell in the ensuing 50 years in southern West Virginia and eastern Kentucky.

Some 20 years after this first shipment of Island Creek coal, another important coal producer, the Pond Creek Pocahontas Co., began operations in McDowell County, West Virginia. Today the coals produced by both these companies are marketed as Island Creek products, by which name they are well known throughout the coal markets of the world.

On the occasion of its golden anniversary, Island Creek is preparing for distribution in March a 44-page brochure describing in pictorial form all phases of modern coal production and marketing. Appearing in this brochure will be a "Pledge to the Future" by Island Creek's president, R. E. Salvati, who reveals an encouraging outlook toward the opportunities that lie ahead for the coal industry in general and for Island Creek in particular.

Oliver Has Biggest Year

The Oliver Iron Mining Co. completed its biggest year of operation in its 61-year history in mid-December when the steamer Benjamin F. Fairless hauled the season's last load of iron ore down the Great Lakes. R. T. Elstad, president, said 1953 was Oliver's biggest year in many ways. The company moved more material, mined more ore, produced more concentrates from low-grade ores and shipped more ore by lake carriers in 1953 than in any other season.

The Oliver Division of the U.S. Steel Corp. operated 27 mines from which it produced an estimated 44,-000,000 tons of iron ore. More than 8100 miners worked in the division's Minnesota and Michigan mines to produce this tonnage. Oliver produced 5,430,433 tons of concentrates from

low-grade ores.

DAVIS READ

Consulting Engineer Operation Layout Modern Production Methods Plant Design Preparation Madisonville, Ky. Chicago, Ill. 235 East Noel Ave.

Attack Roof Fall Problem

Secretary of Interior Douglas Mc-Kay has directed an intensive attack on the coal mining industry's greatest killer, falling rock and coal. As part of the fight against roof falls the U.S. Bureau of Mines has assigned two engineers to work on developing mobile or portable devices to protect miners at the face. Work is to be launched at the Bureau's Central Experiment Station at Pittsburgh, Pa.

Approve Peat Research Program

A research project to utilize Minnesota's vast peat deposits by developing chemical uses for the peat was approved early in January by the Minnesota Iron Range Resources and Rehabilitation Commission. The University of Minnesota and its Duluth branch has agreed to take on the research project and accept a state grant for the work and build up a library on the subject of peat at Duluth. The research program is expected to continue until 1956.

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Mine Strike Over

The long and violent Widen mine strike has ended. On December 28, 1953, United Mine Workers announced that they had given up their drive to organize the Elk River Coal and Lumber Co. at Widen, W. Va.

The 15-month strike was one of the most bitter labor-management disputes in recent West Virginia history. It divided the little community of Widen, W. Va., and brought accusations of terrorism by each side against the other.

Part of the Widen mine's force of nearly 600 employes went on strike in September, 1952, while other miners stayed on the job. Several issues were mentioned at the outset but the one that soon became paramount was a demand for representation by the UMW instead of the existing independent union at the mine.

Record Lake Shipment

Iron ore shipments from the Lake Superior region by lake vessel during the 1953 navigation season reached an all-time high point, according to the Lake Superior Iron Ore Association. During the 1953 ore shipping season, the association reported that 95,844,449 gross tons, railroad weights, were moved by lake vessels.

Reach Full Production

The largest installation in the country loading coal directly from the mine to river barges is in full operation, according to officials of the Uniontown Coal Co., Uniontown, Ky., operators of the big plant owned by the Nashville Coal Co., Nashville, Tenn.

No. 9 coal seam is currently being tapped for an expected annual production of 2,000,000 tons, all of which will be shipped by barge to utilities steam plants on the Ohio, Tennessee and Mississippi rivers.

A conveyor belt carries the coal from the bottom of the slope in the mine to a preparation plant which is almost entirely underground. When the coal has been run through a breaker and preparation process, another ½-mile conveyor picks up the coal and carries it directly to barges or to a 100,000-ton stockpile. Another conveyor, working from the stockpile's bottom, relays the coal to waiting barges.

The barge operation, supervised by the Potter Towing Co., hauls the coal in 3300-ton coal barges—the largest ever to be used on inland waterways. The 4000-ton capacity of these barges can be filled in four hours using the conveyor system.

With 35,000 acres to be mined in the river area, the Uniontown operation will last for some 25 years.

MINING CONGRESS JOURNAL

Barney Shut Down

Alabama By-Products Corp. has suspended production at its Barney mine in Walker County, Ala., due to lack of a market for steam coal. A drift mine in the 33-in. Mary Lee seam, the Barney mine has a 1200-ton daily production capacity and produced 220,000 tons in 1951.

Virginia Tipple Burns

Fire destroyed a large coal tipple of the Coal Processing Corp. in Norton, Va., on December 12, 1953. The tipple had been in use for about ten years and had a daily output of 1500 tons of coal. Two hundred and twenty men were idled indefinitely by the fire.

Win Management Awards

Six mining companies have been certified as "excellently managed" by the American Institute of Management—Freeport Sulphur Co., Newmont Mining Corp. and Texas Gulf Sulphur Co., all of New York; Homestake Mining Co., San Francisco; Hudson Bay Mining & Smelting Co., Ltd., Winnipeg, Manitoba, and Noranda Mines, Ltd., Toronto. All received the award for the fourth consecutive year.

According to Jackson Martindell, president of the Institute, only 348 companies in the United States and Canada, out of the 3000 leading concerns whose methods were studied by that non-profit foundation, were found eligible to receive the designation for the year 1953. When auditing a management the Institute uses a point system for rating ten key factors in each company-ec non ic 'ur tion, corporate structure, health of earnings growth, fairness to stockholders, directorate analysis, research and development, fiscal policies, production efficiency, sales vigor and executive evaluation.

Tenn. Coal Mine Sold

Clinchfield Coal Corp. has purchased the Meadow Creek Coal Co. mine two miles east of Monterey, Tenn. The mine, entirely mechanized, has a capacity of about 300,000 tons of coal a year and an estimated reserve of 300,000,000 tons.

Honor Long-Time Employes

Forty years of employment in the mines of Eastern Gas and Fuel Associates is the record of five veteran mine workers whose anniversaries in coal mining were commemorated in December. They are among 173 mine workers who have been employed by Eastern from 20 to 40 years and whose five-year anniversaries came in 1953.

EG&FA now has 2,075 mine worker and salaried employes who have been with the company from 20 to 50 years.

The five 40-year men are: Millard F. Garbett of the Beards Fork-Page mine; George Melnik, Federal No. 1 mine; Domenico Leo, Helen; Antonio Simplicio, Keystone; and E. J. Evans, Maitland.

Look at Maine Minerals

Maine State Geologist, Joseph F. Trefethen, has reported progress in the State's effort to chart its more promising mineral deposits. Results of the latest in a series of aerial surveys in northeastern Maine showed

some interesting magnetic variations, indicating deposits of some kind of iron bearing ore. Field parties are to survey the areas to learn whether the deposits would be valuable commercially.

Trefethen went on to say that if current tests on Aroostook manganese show that it can be extracted economically, a sizable manganese industry can be expected in Maine.

Aerial surveys for magnetic ores in Maine also have included Geiger counter tests for uranium, but no significant readings are reported.



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Supply House Burns

A supply house owned by D. J. B. Collieries, Inc., near Grundy, W. Va., was partially destroyed in a several-thousand-dollar fire December 17. The supply house contained mining equipment and machinery used at the D. J. B. Coal Mine. Most of the mining equipment, which was stored in a wooden section of the building, was completely destroyed.

Give Mining Town Away

Norton, W. Va., has been donated to the Davis and Elkins College, a small Presbyterian school with approximately 600 students. The mining community, located about six miles west of Elkins, W. Va., was presented to the College with no strings attached by the West Virginia Coal & Coke Corp.

West Kentucky Goes Union

West Kentucky Coal Co. has made known that it will sign a labor contract with the United Mine Workers of America. West Kentucky has been the largest non-union coal producer in the United States.

In commenting on the announcement, Hooper Love, company presi-

Nation's Largest Tungsten Mine



Tungsten Mining Corp., of Henderson, N. C., the country's top mine producer of tungsten, is primary crushing 650 tpd of ore with an 18 by 36-in. jaw crusher. The same tonnage is further crushed in a secondary crushing operation, giving the mill a production record of 650 tons crushed a day. The ore first passes through a 12-in. space bar grizzly at the top of the ore bin, and is then fed from the ore bin to a 36-in, inclined belt. The belt, operating at 100 fpm, serves as a picking belt for removing wood and other foreign material. This belt feeds the crusher.

dent, stated, "It is our intention to make the company's labor relations a model in the industry. It will be our earnest desire to preserve the existing splendid relations with our men and the good people of this community."

Recognize Safe Production

The West Virginia Department of Mines has officially recognized production of more than 3,000,000 tons of coal without a fatality by Slab Fork Coal Co. at its No. 1 and No. 8 mines. Certificates were given to L. L. Fleshman, superintendent of the two mines, and A. J. Walker, general manager, in recognition of the achievement.

Slab Fork No. 1 has passed 2,000,000 tons without a fatality and Slab Fork No. 8 has produced 1,000,000 tons without a death.

The company is located at Slab Fork, W. Va.

Fox Heads Conciliation Board

Representatives of anthracite producing companies of the southern (District Nine) anthracite region have elected Edward G. Fox, president of the Philadelphia and Reading Coal and Iron Co., to represent them as an industry member of the Anthracite Board of Conciliation. He succeeds the late George A. Roos.

Acceptance of this post by the president of the P&R Co. highlights the importance with which management as well as labor views the work of the

Board of Conciliation.

Other industry members of the Board are Edgar Weichel, vice-president, the Hudson Coal Co., representing the northern field, and Evan Evans, board chairman of the Lehigh Navigation Coal Co., for the middle field.

Labor representatives are the presidents of Districts 1, 7 and 9, United Mine Workers of America, August J. Lippi, Mart F. Brennan and Joseph T. Kershetsky, respectively.

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Discover Thorium in N. C.

Ore containing radioactive thorium has been discovered in Ashe County, N. C., according to officials of the H and H Construction Co. of Clarksburg, W. Va. The construction company has announced plans for mining operations in the mountainous area.

The discovery was reportedly made while the company was prospecting for iron and copper in the mountainous country near the Virginia border.

Pocahontas Fuel Expands

A. R. Matthews, president of Pocahontas Fuel Co., Inc., Pocahontas, Va., announced the purchase by Pocahontas of the Moore Coal Co. of Knoxville, Tenn. The Moore Coal Co.'s operation consists of two mines on the Tennessee Railroad with a production capacity of 700,000 tons per year.

Matthews stated that the acquisition of these properties places the Pocahontas Fuel Co. in a position to serve the rapidly growing demands for coal in the south central states and is part of the company's program of diversi-

fication and expansion.

Inter-Mountain Coals, Inc., of Knoxville, Tenn., will act as sales agent for the production of these mines.

Will Expand Nicaro

More nickel for American defense was assured with an announcement recently from the General Services Administration that it will go forward with an expansion of the Government-owned nickel plant at Nicaro, Cuba, and contribute financial assistance to promising research in new nickel metallurgy.

The new program was announced by Edmund F. Mansure, administrator of GSA, upon notification that the Office of Defense Mobilization had certified that the Nicaro expansion and nickel research are "essential to national defense.'

Now in operation, the plant is currently producing nickel at a rate approaching 28,000,000 lb of nickel a year. The certified plan calls for an expansion of 75 percent in capacity. Preliminary engineering studies have already been undertaken for the new structures and equipment which will be required to carry the development from planning to production.

Built early in World War II, Nicaro was shut down in 1947 and later transferred to the National Industrial Reserve in GSA. Its rehabilitation was undertaken in 1951, and the production was renewed in January, 1952. Full operation was reached in July, 1952, and has been sustained ever since. The plant is operated under a management contract by the Nickel Processing Corp., jointly owned by Fomento de Minerales and National Lead Co.



Working from a circular platform, two miners load a round of holes to shoot a ten-ft bench into the pilot raise. Note the safety belts which are worn at all times



Steel forms have been lowered into place and blocked in preparation for a pour of concrete. The corrugated from sheeting separates a safety manway from the airway

Sink Creighton Airshaft

AN underground airway to funnel fresh air to workings almost a mile below surface is being driven at the Creighton Mine of the International Nickel Co. of Canada, Ltd., in the Sudbury District of Ontario.

Part of long-planned preparations for bringing the lower levels of the mine into full-scale ore production, the airway is more than 13 ft in diam and is concrete lined.

Designed to serve the famous Creighton Mine from 58 to 64 levels with 350,000 cfm of air, the new airway involves driving through 600 ft of solid rock. It fits into the mine's elaborate ventilation system of which the main intake fan is located on 40 level and the main exhaust fan on 30 level. A portion of the airway is being partitioned off with corrugated iron sheeting to serve as a continuation of the mine's safety manway to surface, and also to carry the pipelines in which sand fill will be sent down from surface to replace ore taken from the stopes when mining gets under way.

Raise Then Strip

An innovation at Inco is the special construction method by which the big air shaft is being installed. A rectangular pilot raise, 7 by 11 ft, is first driven upwards in 200-ft sections by regular mining technique. Then, working from the top down, each section of the pilot raise is widened to the dimensions of the circular airway, 13 ft 6 in. in diam, and is concreted. Widening and concreting operations are carried on from a platform suspended on four sets of chains from eye bolts driven into a finished "lift" of the airway wall. Working from the platform, miners start the construction cycle by drilling and loading a circular 10-ft bench which will round out the rectangular opening of the pilot raise. The platform is pulled up during blasting; the broken rock drops down the pilot raise and is trammed away on the level below.

When the platform is returned to working position after a blast, and loose rock scaled off, holes are drilled for the steel pins to support the cylindrical sectional steel forms for the next pour of concrete. The forms are lowered, blocked and braced to the bench, and lined up. Hitch boxes are set in to leave openings for the steel dividers supporting the manway platforms and partition, and all is then in readiness for the pour. A connection is made to the concrete pour pipe which has been carried down in the

manway compartment as construction of the airway progressed, and concrete is poured by gravity flow from the mixing station located up on 56 level.

While the 10-ft "lift" is setting another round is drilled.

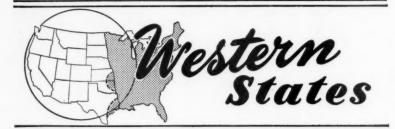
The efficiency of the construction cycle owes much to the sectional steel forms, which can be lowered into position for each pour in a fraction of the time it would take to set up wooden forms, and of course can be used over and over again. Another important factor is the "push-button" service on concrete.

At each level of the mine a concreted station is being established in which ventilation system controls for the airway will be located.



Florida Chemical Plant Under Construction

Shown is an artist's rendition of The Davison Chemical Corp. first plant for the production of triple superphosphate, now under construction at Bartow. Fla., and scheduled for early 1954 operation. The area shown as occupied by the plant is approximately 45 acres. The Dorr Co., Stamford, Conn., are architect engineers. Rated at an annual production capacity of 200,000 tons, the plant will mark Davison's entry into triple superphosphate production and is part of a large expansion program which the company has under way. Illustrated at the left is sulphur storage and next to it the contact sulphuric acid plant, daily capacity 550 tons; acid is transferred above railroad tracks to main process building—note storage silos with capacity of 1000 tons of phosphate rock, near the tracks. Long building in background houses the shops; the group of buildings to the right includes shipping facilities and finished product warehouse; above the warehouse, at left, the office and laboratory; right, the change house for workers



South Dakota Uranium Mine

The Sodak Mining Co. of Edgemont, S. D., has announced it will begin uranium mining operations shortly on the Alex Kling ranch, seven miles west of Belle Fourche. Clyde Boyle, manager of the company, said 27 showings of radioactive minerals have been discovered in a 1½-mile strip of land on the Kling and Enrico Bonato properties.

Kennecott in Aluminum Now

Kennecott Copper Corp. has confirmed a Kaiser Aluminum & Chemical Corp. announcement that arrangements have been concluded providing for the purchase by Kennecott for investment of \$16,250,000 par value of a new series of convertible preferred stock from the Kaiser Aluminum & Chemical Corp. and 100,000 shares of Kaiser Aluminum & Chemical Corp. common stock from the founding stockholders of the Kaiser Aluminum & Chemical Corp.

CF&I Sets Production Record

Breaking all previous records, the four blast furnaces at the Pueblo plant of the Colorado Fuel and Iron Corp. produced more than a million tons of iron in 1953, according to A. F. Franz, president.

The million-ton mark was passed at midnight, December 1, Franz said, representing a considerable increase over the former record of 867,158 tons set in 1951.

Complete Star Tunnel

An 8500-ft tunnel has been completed between mines of the Sullivan and Hecla companies at Burke, Idaho. The tunnel will eliminate hoisting and water pumping in the Hecla shaft, improve ventilation and enable men to get to the working faces faster. It was completed after ten months' work and connects the collar of the Hecla shaft with the 2000-ft level of Sullivan's Star mine. It is the first surface adit to the Star mine from the Burke side of the mountain under which it is located.

The portion of the tunnel driven from inside is being slabbed to the 10 by 11-ft dimensions of the segment driven from the outside. Inside crews broke only a 7½-ft width, both to speed up their advance and to reduce the amount of waste rock to be handled through the mine workings.

The Star mine was originally opened in 1924 through a 9000-ft crosscut from the 2000-ft level of the Hecla shaft at Burke. Since that time workings have been extended upward for about 3000 ft and downward about 2300 ft to the 6300 level and all production has been taken out through the Hecla shaft. After the new adit is in use, the Hecla shaft will be sealed by means of a concrete plug in the 2000 level crosscut and the Hecla workings allowed to fill with water.

Reopen Mine

The Bunker Hill mine, consisting of seven claims in the vicinity of the Keynote Mountains near Randsburg, Calif., is expected to be back in production again early in 1954 after being idle since 1938. Construction crews are repairing buildings, tramways, bunkers and mill equipment for handling lead, silver, zinc, gold and scheelite ores. Showings of scheelite in the workings may justify installation of four new concentrating tables.

Montana Mineral Output Up

Montana mine production rose in 1953 six percent over 1952, according to a preliminary report by the U.S. Bureau of Mines. Output of copper, according to the report, increased nearly 29 percent to 79,790 tons, the most since 1945. Silver production was up 6 percent. Lead output decreased 8 percent and zinc dropped 2 percent. Gold production was off 4 percent, according to the report.

The sharp increase in Montana's copper production was provided largely by the Kelley mine of Anaconda Copper Mining Co.'s Greater Butte project.

Butte mines produced less lead and zinc than in 1952 but the Jack Waite mine in Sanders County, operated by American Smelting and Refining Co., increased its output. The Marget Ann mine of the Mitchell Mining Co. near Walkerville in the Butte area was Montana's leading producer of gold-silver ore, the report said.

Complete Cottrell Installation

Vitro Chemical Co. of Salt Lake City has completed the installation of a Cottrell electrostatic dust precipitator at its uranium plant in Salt Lake. The equipment is designed to remove minute particles of dust containing valuable uranium minerals. The minerals will be recovered from the dust and processed. Engineers on the project were Western Precipitation Corp. of Los Angeles. The 45-ft high 12-ft square (at base) unit was erected by Gibbons & Reed Construction Co., Salt Lake City, and Howard P. Foley Co., electrical contractors.

Expand Uranium Mill

The Vanadium Corporation of America has announced it has obtained permission of the AEC to install a roaster at its Naturita (Colo.) mill for processing vanadium-uranium ores mined from its own properties and purchased from independent producers. This and auxiliary facilities now being built should be ready before the end of the year.

The company has exercised its option to purchase the mill at Durango, Colo., which also processes uraniumvanadium ores. For the past five years the company has operated the mill under lease from the AEC.





D. H. McLaughlin Chairman, Western Division



Frank R. Milliken
Chairman,
Program Committee



Worthen Bradley Co-Chairman of Arrangements



Ralph K. Gottshall
Chairman,
Manufacturers Division

1954 Metal and Nonmetallic Mining Show

WITH the announcement last month by Donald H. McLaughlin, president of Homestake Mining Co. and chairman of the Western Division of the American Mining Congress, that Frank R. Milliken had accepted the chairmanship of the National Program Committee, plans for the 1954 Metal and Nonmetallic Mining Convention and Exposition got into high gear. This, the greatest mining event of the year, will be held in San Francisco September 20-24.

Serving with Mr. McLaughlin as co-chairman of the San Francisco General Committee will be Worthen Bradley, president, Bradley Mining Co. Vice-Chairmen are Albert F. Knorp, secretary of the California Chapter of AMC and Granville S. Borden, vice-president, Idaho Maryland Mines Corp. S. H. Williston, vice-president, Cordero Mining Co., and Philip R. Bradley, Jr., president, Pacific Mining Co., have been appointed co-chairmen of Publicity and Attendance. Heading the Welcoming Committee are L. T. Kett, general manager, Mountain Copper Co., Ltd., and Jack H. How, vicepresident, Western Machinery Co., while H. A. Sawin, Yuba Manufacturing Co., and Max F. Holsinger, general manager, Mining World, are cochairmen of the Trips Committee. The ladies' events are being planned by the Ladies Committee with Mrs. Frank Girard as honorary chairman, and Mrs. Philip R. Bradley, Jr., as chairman.

The National Program Committee, under the chairmanship of Mr. Milliken, who is vice-president of Kennecott Copper Corp., is entrusted with the important job of developing the Convention pro-

gram for the San Francisco meeting. In view of far-reaching developments on the economic, legislative and technological fronts, the 1954 Convention promises to be an event of major importance. It will bring together for thorough discussions of mining problems the leading authorities in every field.

The Manufacturers Division of the American Mining Congress, under the chairmanship of Ralph K. Gottshall, president of Atlas Powder Co., began making plans a year ago to fashion a mining show that will be outstanding in every respect. No mining man can afford to miss the opportunity to see at first hand what is new in mining and milling machinery of all types.

On Friday, September 24, immediately following the close of the AMC Convention and Exposition, the Minerals Beneficiation Division of the A.I.M.E. will hold its one-day fall meeting. There will be morning and afternoon sessions and a luncheon. This affords members of MBD and any others interested the opportunity to attend two important meetings on one trip.

A large attendance is assured at the Convention and Exposition, and San Francisco has promised to do its utmost to accommodate all comers. The city has many fine hotels and everyone attending the Convention will be sure of comfortable accommodations, however not everyone may be able to stay where he wishes, and reservations should be made as soon as possible. All hotel reservations will be handled through the San Francisco Convention and Visitors Bureau, Room 300, 61 Grove St., San Francisco 2, Calif. Write now.

Freedom Mine

The Vanadium Corp. of America has laid claim to the largest pitch-blende uranium mine in the United States. D. W. Viles, vice-president of VCA, has said it is the aim of his firm to make the mine the largest producer in the United States. The property is the Freedom group of claims at Marysvale, Utah, owned by Pratt Seegmiller and leased to VCA. The firm recently completed a three-compartment shaft, the bottom level of

which connects with a 2000-ft crosscut, which would be used for a main haulage tunnel on that level. Ore can be dropped from upper workings and trammed from the chutes to the shaft for truck transportation to the mill.

As a result of four years' work, the firm now has ore at a depth of 750 ft, and it is hoped that it continues at depth. The company believes it has the largest pitchblende showing in the country. With proper development the company says the district will develop other bodies of pitchblende ore.

Revamp Sunshine Mill

Sunshine Mining Co. has installed new flotation equipment at its big milling plant in Wallace, Idaho. Thirty new Fagergren cells and six Agitair cells were installed to replace 48 old flotation machines.

Ten of the new "Fags" will make up the primary silver-copper circuit and the other 20 will be used in the lead-iron bank of the two-circuit mill. The Agitair equipment will serve as a retreatment unit for the high-grade product.

Find Uranium in Gold Camp

A uranium discovery has reportedly been made in a worked-out gold mining shaft near Central City, Colo. The United Mining & Leasing Corp., a Central City company, claims pitchblende and torbernite, both sources of uranium, have been found.

Lease Colville Mine

Ed Brewer and Warren Leibman of Colville, Wash., have taken a five-year lease on Pioneer Mining Co.'s properties, 14 miles northeast of Colville, Wash., according to Darrell Newland, president of Pioneer. The equipment includes a 50-ton mill. Concentrates shipped from the mine to the Kellogg smelter show values in silver, lead and zinc, with some gold.

Brewer was formerly employed as mine superintendent at the Bonanza Lead property near Colville and Liebman was mill superintendent at the same property. They plan to sink a 50-ft shaft from the 100-ft level, following a vein revealed in recent diamond drilling operations. Sufficient ore was blocked out in the drilling to operate the mill for several months.

Hecla Will Develop Princeton

An agreement has been negotiated between the Princeton Mining Co. and Hecla Mining Co. for development of the Princeton property in the Coeur d'Alene district of northern Idaho. Hecla is to perform a minimum of 1000 ft of underground work within a four-year period and a like amount each succeeding year until commercial ore is discovered or an undisclosed amount of money has been spent.

Holdings of Princeton comprise 36 mining claims lying along the Deadman Gulch sheer zone east of Mullan, Idaho. Claims of Eastern Lead Corp. and Fortune Mining Co. recently were consolidated with the Princeton group.

Auto Magnate Enters Mining

An option to purchase the Big Buck uranium claims in the Big Indian mining district, San Juan County, Utah, has reportedly been obtained by Joseph W. Frazer, national automobile figure from Chas. A. Steen and Wm. McCormack. Frazer and his associates in the newly-formed Standard Uranium Corp. have agreed to expend a large sum during the next six months in search of additional uranium ore on the claims. Utah State Senator Donald A. Adams and Dan Hayes of Monticello, Utah, own the claims and sold the original option on the group to Steen and Mc-Cormack.

Complete Long Tunnel

A ten-mile tunnel under the coastal mountains of British Columbia has been completed in record time. The tunnel, which will carry water to the largest underground hydro-electric power station ever projected, was driven from opposite ends and completed in 21 months. A total of more than 2,300,000 tons of rock were removed from the 25-ft diam tunnel.

One of the drilling crews established a record of 282 ft of tunnel completed in six days, including a maximum advance of 61 ft in one day.

To Post Uranium Search Info

In furtherance of the policy of the U. S. Atomic Energy Commission of publicly releasing information concerning the location of surface areas of high radioactivity that have been found by airborne detection instruments, a temporary posting place will be established at Mojave, Calif., for the period in which airborne reconnaissance surveys are being conducted in that area.

Starting January 15, 1954, and on the 15th day of each following month an index map showing locations of anomalous areas in the general vicinity of Mojave will be posted at noon, Mountain Standard Time at the post office in Mojave (Kern County).



CAL-WIC Industrial Screens for the metal mining industry are fabricated of the toughest steels and alloys to give long life and long-run economy. Whether for processing, cleaning, grading, filtering or screening, there is a correct weave, weight

and opening. Reduce down-time in your screening operations by installing CAL-WIC Industrial Screens.

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Hydrometallurgical Engineer for position in rapidly expanding long range program. Experience in process development, design, operation and administration desirable. Ability to deal with people important. Starting salary \$8360 to \$9360. Write: U. S. Atomic Energy Commission, Grand Junction, Colorado.

Explore New Silver Vein

Crews of the Summit King Mines, Ltd., have drifted on a silver vein recently rediscovered on the 550-ft level. Width of the vein has been four ft and it is believed that a large tonnage of ore will be developed. The mine is located one mile north of Tonopah, Nev.

Sky City Ready for Output

W. M. Dickerson, president of the Wannamaker Mining & Milling Co., reports that the company has completed development work at its Sky City mine located 60 miles southwest of Saguache, Colo. Development work has opened up a rich vein of gold and silver bearing ores, according to Dickerson.

This new development with other mines in the area are now ready for production and along with the copper, silver and lead bodies are awaiting the completion of the processing plant of the Saguache Smelting Co. at Saguache.

AEC Accepts RR Deliveries

Announcement has been made by Sheldon P. Wimpfen, manager of the AEC Grand Junction, Colo., Operations Office that railroad car deliveries of ore will be accepted at the AEC uranium ore buying station at Edgemont, S. D. The ore buying station facilities have been expanded to handle increased tonnages of ore and to provide a means of obtaining rail haulage rates for shippers producing ores in areas a greater distance from the station, such as those operating in eastern Wyoming.

American Smelting and Refining Co., ore buying agent for the Commission, recently completed an expansion program which included installation of mechanical sampling procedures. Equipment was also provided for doubling the capacity of the plant.

Uranium ore producers who elect to ship by rail will have to comply with three conditions: (1) Railroad cars must be gondola type, flat bottomed and solid bed; (2) routing must specify Chicago, Burlington and Quincy delivery and shipments must be consigned to American Smelting and Refining Co., Edgemont, S. D.; and (3) rail freight must be prepaid by the shipper.

Drillers Report!



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FEBRUARY, 1954

Lucky Friday's Shaft

John Sekulic, president of Lucky Friday Silver-Lead Mines near Wallace, Idaho, has reported that the company will concentrate on completing its new three-compartment shaft in 1954. The project, which includes hoisting facilities, is essential to any substantial increase in production and proper exploration and development of the firm's expanded holdings.

The new shaft will extend from the 2400-ft level at the mine's bottom to 70 ft above the 1800-ft level.

Shaft Nears Completion

An inclined shaft being sunk near Dixon, Mont., by Amador Mining Co. is nearing completion, reports James F. Charlton, president. Cutting a station on a new level is now under way. Drifting under known orebodies is to start as soon as possible. This will deepen existing workings to 250 ft, with an additional 200 ft of sinking contemplated next spring.

Cleaning War Eagle Up

The lower tunnel on the War Eagle Claim in Jackson County, Ore., is being cleaned out and operators plan to do further exploration work as mining equipment is obtained. A quicksilver mine, War Eagle was first discovered in 1916 and quicksilver has been produced at various times since. Cinnabar occurs in a matrix of breccia in clay gouge. At the mine a small retort has been built and some mercury produced.

Plan U-Ore Mill Expansion

The Atomic Energy Commission plans an expansion program for its mill at Monticello, Utah, providing the agency obtains approval of an appropriation request. The changes would take place during 1954. The mill, one of the oldest on the Colorado Plateau and the only one owned by the government, utilizes a caustic or soda ash reduction process in changing uranium ores into uranium oxides. The AEC plans to replace the caustic ash reduction process with the conventional sulphuric acid leach method used at most of the mills on the Colorado Plateau. The change would enable the Monticello mill to treat the new uranium-vanadium ores developed in San Juan County during the past vear.

The Galigher Co. of Salt Lake City operates the mill on contract for the AEC. Uranium mill capacities are not public information, but the AEC confirmation underscores the rapidly developing economic importance of uranium mining and milling on the plateau in general and San Juan County in particular.

-Are There Any Higher?-

In November we published a little item in these pages on what was claimed to be the highest coal mine in the world. The item concerned the mine of the Coleman Collieries Limited, of Coleman, Alberta, Canada, 7400 ft up on the peak of Tent Mountain.

Two of our readers in the high Andes took exception to this claim and raised the question in our mind as to whether their coal mine is the highest. Their interesting letter is reproduced here in the hopes that it will help us determine where the world's highest coal mine really is.

"Your article, 'World's Highest Coal Mine,' in the November, 1953, issue of 'The Mining Congress Journal' is slightly erroneous in claiming that the Coleman Collieries Ltd. coal mine in Alberta, Canada, is the world's highest.

"Our company has operated an underground coal mine here in the high Andes at an elevation of 13,320 ft for the past 25 years. This mine is still in operation and supplies fuel for our heating plant and for domestic consumption by the native village. In the past years, when there was a producing smelter here on the property, the mine also supplied the smelter with coking coal.

"We do not make the claim that this is the world's highest coal mine, but it is certainly one of the highest."

Black Rock Output

Tungsten production is being increased by the Black Rock Mining Corp. at its Black Rock mine, 25 miles north of Bishop, Calif. Output is now 325 tpd, according to J. J. Strutzel, Jr., general manager. Black Rock is a subsidiary of the Wah Chang Corp., world's largest tungsten refining company. A shortage of mill water at the Black Rock has limited milling operations to 150 tpd. The remaining 175 tons of ore is trucked daily to the Pine Creek flotation mill of the U.S. Vanadium Co. A new shaft near the mill site has encountered water and it is anticipated that milling at the Black Rock can be expanded.

Big Uranium Deal

One of the largest uranium mine sales on record has recently been made. The Four Corners Uranium Corp. purchased 191 claims in the Bull Canyon area of southwestern Colorado from State Senator D. Lew Williams and associates. Three operating uranium mines are on the claims. All are part of the Wedding Bell group originally known as the McKee claims. The property is near the Utah, Arizona and New Mexico borders.

Milling Montana Tungsten

A new 300-ton mill of the Minerals Engineering Co. at Glen, Mont., has been in full operation since mid-November treating tungsten ore. Ore is being produced at the Lost Creek mine of Minerals Engineering and the American Alloy Metal's Brown Lake mine on opposite sides of Sugarloaf mountain in Beaverhead County, Mont.

Both properties, operated by Min-

erals Engineering Co., have been under exploration and development for two years. They are operated as openpit mines.

Construction of the new mill took less than three months. Clearing of the site was started in mid-August and actual construction got under way about September 1. Operations at near capacity were started on November 16 after four days of testing.

Complete Lynn Lake Track

The 300-mile extension of the Canadian National Railway to Lynn Lake, Manitoba, has been completed. The last steel was laid October 24, 1953, and the last spike, made of Lynn Lake nickel, was driven November 9, 1953.

Lynn Lake is the location of the new mine and concentrator of the Sherritt Gordon Mines, Ltd.

Alaska Coal Mine

The Usibelli Coal Mines, Inc., operators of the Usibelli Coal Mine near Fairbanks, Alaska, expect to double production when they go underground next fall. During 1953 the mine yielded 300,000 tons of coal. At the present time the mine is operated as a stripping operation.

Besides the latest type of underground mining equipment the company plans to purchase a heavy media

coal washing plant.

Underground mining will be done at the level of the mining camp which is located at 1550 ft. At the present time there are 75 employed and an extra 65 will be taken on when expanded operations are begun. A 60-man dormitory and a new boiler house were recently built to accommodate the extra miners.

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West Produces More Iron Ore

Iron ore production was substantially increased in Utah, California and Wyoming, according to year-end estimates. Utah production was up 21 percent, Wyoming, 18 percent and California, 15 percent, according to unofficial figures. The three states unofficial figures. produced 5,900,000 tons in 1952 and an estimated 7,148,000 tons in 1953.

Day Mines Tree Farming

An extensive tree-farming project is being carried out by Day Mines, Inc., on its north Idaho, Montana and northeastern Washington mineral holdings. According to Herb Carlson, consulting forester for the company, the objective is to provide permanent stability of yield to supply the company's timber needs.

U. P. Announces Diesel Purchase

The Union Pacific Railroad recently announced that it had purchased 205 diesel locomotives. The order was the largest single diesel purchase in railroad history and leaves a dark cloud over the large coal mining area around Rock Springs, Wyo., where U. P. mines much of its railroad fuel. It is estimated that 75 percent of all coal mined in the area is used by the railroad.

Wyoming Governor C. J. Rogers has announced emergency plans to combat unemployment in the Rock Springs area. His plans would include stepping up of highway improvement work in the area and he also said he would push for construction of the proposed Seedskadee dam on the Green River west of Rock Springs.

At one time more than 4000 miners were employed in the Rock Springs The number has now dropped to 1700 with prospects of a greater reduction with U. P.'s announcement of its dieselization program.

Explosion in Gilsonite Mine

Officials of the American Gilsonite Co. blamed overheated equipment for the explosion and fire which swept their open cut gilsonite mine at Bonanza, Utah, on November 5. The disaster took the lives of eight men working in the pit at the time of the explosion and injured four other men who were working on the surface. The Chairman of the Utah State Industrial Commission, O. A. Wiesley, issued an official statement on the cause of the blast confirming the report of the company officials.



The mine is an open pit some 1100 ft long, 600 ft deep and only 15 ft wide at depth. It is oriented in a general east-west direction. The official statement by the commission re-ported in part, "one of the several operations in progress may have been the source of the explosion. However, the evidence as stated by two survivors indicates that the flame originated on the surface in or near the headhouse or possibly at the elevator. This is supported by the fact that men about three ft from the flame ran and escaped the force of the explosion. It is believed that the flame then entered the mine with sufficient intensity to propogate an explosion throughout the mine. Of the possible sources of ignition, the most logical appears to be one of the following: Static sparks, friction sparks or over-heated equipment." The latter was believed the most logical cause.



Hendrick Wedge-Slot Screens have very small openings yet have greater draining and screening capacity. They retain material that would ordinarily be wasted or cause expensive time delays for reprocessing.

Profile bars are shaped to maintain uniform width of slot openings as wear progresses. Long screen service life and constant ore quality are always maintained. Let us know your particular operating methods and we'll be glad to recommend the right Hendrick Wedge-Slot Screen for your specific needs.

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Milling N. M. Manganese

The Tower Mining and Refining Co. is putting a new manganese ore milling plant into operation at Truth or Consequences, N. M. The heavy media type mill has a capacity of 30 tons of feed per hour. A large reserve of manganese ore is reported at the mill site.

Install U-Ore Roaster

Operations of a roaster for ore bearing uranium and vanadium at the Naturita, Colo., mill of Vanadium Corp. of America, has been announced. Construction of the roaster was completed in 80 days by the company's 120 employes. The third such roaster installed at Naturita, this one increases the mill capacity by 80 per-

Improve Calif. Cement Plant

Calaveras Cement Co. will spend a third of a million dollars during 1954 to increase the efficiency of its San Andreas (Calif.) plant.

The company's board of directors has voted an expenditure of \$328,000 for refinements in manufacturing and shipping processes. These are expected to streamline plant operations and reduce operating costs. The plant, one of the largest and most modern in the West, has increased its capacity

200 percent since the end of World War II.

The improvement program calls for addition of a number of new lightweight bulk cement trains to the company's large transport fleet, a complete changeover in sack-loading equipment, modernization of materials handling facilities, and purchase of Multiclone equipment to improve burning efficiency of the plant's four kilns. A new Bucyrus-Erie rotary drill will be added to quarry equipment, and a Caterpillar motor grader will be placed in service for maintenance of company roads.

Will Build Tungsten Mill

Standard Tungsten Corp. of New York and Taipeh, Formosa, is building a 150-ton tungsten mill at Pomerine, Ariz., on a five-acre site acquired from Kramer Mining & Milling Co., to serve mines now being operated by Standard in Cochise County, Ariz., and Hidalgo County, N. M.

Initially the firm plans to employ about 30 men. Later the force will be increased to 100 when the mill is completed and full-scale operations are started. Mill construction follows 90 days of pilot plant work at the mill site. Dr. Hu, a graduate of Massachusetts Institute of Technology in engineering, was in charge of several Chinese-American projects in California during World War II. Standard Tungsten is described by Hu as an international firm dealing in mining, milling and industrial trading. It specializes in production and trading of rare metals and also does some tungsten production and milling.

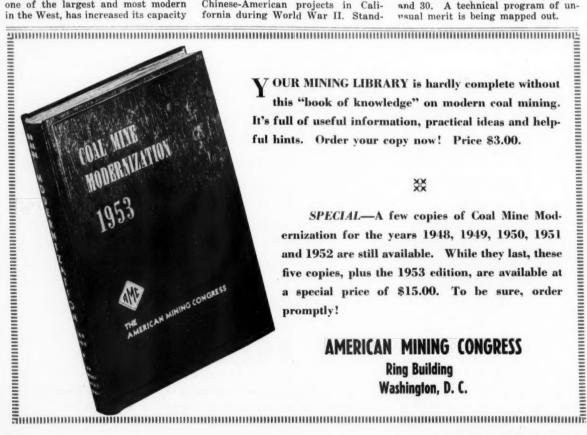
Henry G. Grundstedt is in charge of Standard's general development in the Pomerine area. Mill construction is in charge of James Baize. Othel Conger and Ralph Pursley are supervising mine operations.

New Uranium Claims Staked

A Milwaukee (Wis.) firm has announced that surface uranium has been discovered on claims staked out by the company in southeastern Utah. A. P. Slagter, Jr., president of Slagter Producing Co., reports that mining equipment has been sent to the claim site. Slagter said that uranium was found by geologists on two of the firm's 28 claims which range from 20 to 280 acres in size. No estimate of their value was given.

RMCMI Meets in June

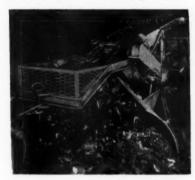
The Golden anniversary of the Rocky Mountain Coal Mining Institute will be celebrated this year with the holding of the fiftieth convention of that group in the Colorado Hotel in Glenwood Springs June 27, 28, 29 and 30. A technical program of unusual merit is being mapped out.





Clean Your Track

The Canton Track Cleaner, manufactured by the American Mine Door Co., Canton, Ohio, is seeing more and more service in this country's mines.



It is being used effectively wherever track cleaning is a problem. According to its manufacturer, important savings are possible by the elimination of a substantial amount of labor costs.

Galion Acquires Austin Mfg. Co.

The Galion Allsteel Body Co. has announced acquisition of sales and manufacturing rights to the complete line of Austin Overshot tractor loaders, patented and built by John Austin Mfg. Co., Denver.

Save Core Drilling Time

Recent introduction by the E. J. Longyear Co., Minneapolis, Minn., of Wire Line Core Barrel equipment has provided the diamond core drilling industry with a new tool and technique which promises to revolutionize exploratory drilling, according to the company. This small diameter wire line equipment has been under continuous development and tests since 1947.

Significant features of the Wire Line Core Barrel, for which patents have been applied, are as follows:

(1) The string of drill rods is taken from the drill hole only when it is required to replace the diamond core bit.

(2) With skilled operators, the extraction of the core-laden inner tube and lowering of the empty inner tube in a 1500-ft hole requires about 15 to

20 minutes, as compared to at least 60 minutes' round-trip time using conventional diamond core drill rods and core harrel.

(3) The core barrel is equipped with a ball-bearing, swivel-type head and optional, if desired, with a water shutoff valve. The instant a core block occurs in the bit or inner tube, the water shut-off valve action prevents the circulation of fluid, alerts the operator, and forces him to "pull" before core grinding starts.

Plastic Wire Rope Core

For the first time in the cordage industry, a new all-plastic center for use as a core in wire rope has been developed by the Columbian Rope Co. of Auburn, N. Y., and is now being offered to wire rope manufacturers.

Check AC Circuit Loads

A new portable recording instrument for obtaining a permanent record of alternating current and voltages has been developed by General Electric Co.'s Meter and Instrument Department.

The new volt-ammeter, designated G-E Type CF-7, combines features of a self-latching multirange hook-on current transformer and the simplicity of the Type CF inkless recorder in equipment suitable for indoor and outdoor applications.

It is expected to be particularly useful for checking loads on distribution



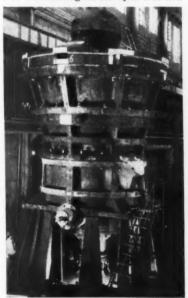
lines, verifying motor loads, and in detecting overload circuits, transformers, motors, and other a-c apparatus.

According to GE engineers, alternating current can be measured and recorded on both insulated and non-insulated conductors in circuits operating at potentials up to 8700 v.

Can Crush 2200 Tph

Being inspected before shipment to the Presque Isle Corp. project in lower Michigan is this 60-89 "Superior" crusher, one of the largest of its kind, built by Allis-Chalmers Manufacturing Co.

The 1800 to 2200-tph crusher has an 8 to 9-in, setting on the open side and

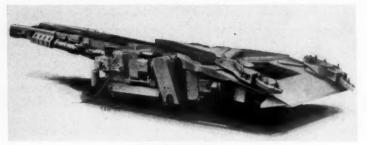


a 1½-in, throw. It is equipped with a push-button controlled "Hydroset" mechanism which regulates the open side setting and permits rapid compensation for wear on the concaves or mantle. The crusher is powered by a 350-hp, 720-rpm motor.

The new quarry is a joint venture of five major steel companies and will be operated by Kelley Island Lime and Transport Co.

Wetting Agent

Mona Industries, Inc., 65-75 E. 23rd St., Paterson 4, N. J., is now manufacturing Monawet Mo, a wetting agent of the dioctyl sodium sulfosuccinate type. According to the manufacturers this product has proved its usefulness wherever penetration, wetting-out or depression of surface tension is required.



New Crawler Loader

The new Jeffrey ML-81 Crawler Loader, designed to operate in coal seams 38 in. and up, has recently been put into production by the Jeffrey Mfg. Co., Columbus, Ohio.

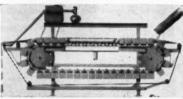
Four models are available, with machine heights of either 325/16 or 36 in. and either 10 or 15 hp head and traction motors. The loading head is fully gear driven on all models.

According to the manufacturer, the ML-81 will have a rated loading capacity of eight tpm of coal with 15-hp motors and six tpm with 10 hp motors. patents covering two-wheel tractors. In addition, Harvester acquires designs and manufacturing data which will materially shorten the time otherwise required by Harvester to engage in the production of the tractors.

Introduce Filter

Hardinge Co., Inc., York, Pa., announces the "Tray Belt Filter" - a new type of continuous, liquid-solids separating device which can be used: (1) for relatively fast filtering materials; (2) for washing grains or salts, either by direct or countercurrent action; (3) for filtering solids not readily maintained in a fluid suspension prior to filtering.

The unit consists of a series of con-



nected, traveling, perforated trays in sliding contact with a suction box beneath and supporting a filter cloth which moves with but is not attached to the trays. The raw liquid-solids mixture is fed by gravity onto one end of this conveyor-like structure. The suction box removes liquid from the feed, leaving a filter cake which drops from the filter at the discharge end.

A washing action may be combined with filtration by use of water sprays above the filter cloth.

Big Coal Haul

Hauling average loads of 50 tons and averaging approximately 20 mph on a round-trip haul of 8.5 miles, Hanna Coal Co.'s new fleet of 47-ton



Euclid Coal Haulers are helping the company to decrease cost.

A complete cycle, including loading and dumping, is being made in an average of 29 min.

The units are the largest ever built by Euclid for hauling coal and are powered by 350-hp diesel engines. Payload capacity is 94,000 lb or 62 cu

Announce Air-Lea Drills

Two new lightweight one-man airleg drills, incorporating the Gardner-Denver Series "8" rock drills, have been announced by Gardner-Denver Co. of Quincy, Ill.

Model FL48 carries a 21/2-in. bore

drill, and weighs 79 lb with a 4-ft feed leg.

Model FL58 carries a 2%-in. bore drill, and weighs 87 lb with a 4-ft feed leg. Either model is available with a 2, 3, 4 or 5-ft feed travel.

The new drills have been designed for convenient and easy handling, advantages which enable the miner to drill high footage during the shift without undue fatigue.

Only one air hose is required, as air is fed to the feed leg through the swivel connection. Air and water hoses are located on the right side, opposite the drill runner's most common position, and out of the way.

Improve Roof Bolt Shell

Roof-Lock, a steel expansion anchor for roof bolting, has been further improved by the development of Plug-Lock. The new model eliminates the



need for straps, nuts or ears on the bolt to hold the plug in position. This is possible by the casting of depressions in the plug which are gripped by two fingers of the steel expansion anchor

For complete information or test samples, contact Mining Products Division, Equipment Corp. of America, 2013 St. Clair Ave., Cleveland 14, Ohio.

Goodman Acquires New Line

The Goodman Manufacturing Co. of Chicago has acquired from Diamond Iron Works, Minneapolis, its line of crushing, screening and handling equipment for rock, sand and gravel.

Operating as Diamond Iron Works, Division, Goodman Manufacturing Co., manufacture will be transferred to the Goodman main plant located at 4834 South Halsted St., Chicago, Ill.

Key personnel of Diamond concerned directly with sales, engineering and service will be retained under the direction of Carl E. Hanson, sales manager, and W. Eckley, chief engineer, who will make Chicago their headquarters.

Harvester Rounds Out Line

International Harvester Co., continuing its program to round out a full line of equipment in the industrial power and earth-moving industry, announced an agreement with the Heil Co. of Milwaukee which will enable Harvester to manufacture twowheel rubber-tired industrial tractors for use in heavy construction work. The announcement was made jointly by Joseph F. Heil, president, the Heil Co., and H. T. Reishus, vice-president, International Harvester Co., and executive head of his company's industrial power division.

The arrangement between the two companies is covered by a contract under which Harvester acquires Heil yd struck and 70 cu yd heaped at a 3-to-1 slope. The units have a 10speed transmission, air assist clutch and hydraulic booster steering.

Add Rock Bits to Line

A full series of carbide-tipped detachable rock bits will be added to the Coromant drill steel line, according to Copco Pacific, Ltd.

The new bits will be available in diameters ranging from 1% to 4 in.



by March. Field tests on selected Western projects now are under way to compile case history data, and to verify records of Canadian comparative tests which showed the new tools to be drilling up to 300 percent more footage.

Literature on the new detachable bits, as well as on other Coromant steel products and Atlas Rock Drills which Copco Pacific also distributes, may be obtained from the company at 930 Brittan Ave., San Carlos, Calif.

New Drill Steel Available

A new alloy hollow drill steel with a wider range of hardening temperatures has been developed by the Crucible Steel Co. of America to meet physical specifications written by the Metallurgical Department of the Ingersoll-Rand Co. The new steel is more fool-proof to heat treatment, is easier to forge and requires only a simple annealing procedure for good machineability, according to the manufacturer. A proper degree of hardness is easily attained.

The manufacturer also claims the new steel requires no change in heat treatment from that used for the present popular chrome moly type of steels but has a wider latitude in heat treatment. This eliminates the necessity of segregating this steel at locations currently using the chrome moly type. It is low in strategic alloying elements and is more resistant to scaling.

The steel is made to Ingersoll-Rand Specification No. 551. A limited supply is now available from the Ingersoll-Rand Co., or from the Crucible Steel Co. of America. Crucible has identified it as EEEE. The manufacturer says that the new steel costs slightly more to produce than current alloy steels, but its increased cost is more than offset by its advantages.

Use Rayon in Belts

Conveyor belts made of rayon which weigh less than conventional cotton duck belts but are equally as strong are now being marketed by United States Rubber Co.

Field tests have indicated that rayon belts, like other belts made with synthetic fibers, hold fasteners better than conventional duck belts. The rayon belts can also be repaired with the same techniques as conventional duck belts.

They can be used in most locations where duck belts are now used, especially in coal mines, cement plants and coal preparation plants. These rayon belts will be marketed under the trade names U. S. Matchless and U. S. Giant.

Message Repeater

An automatic, audio, messagerepeating device embodying a magazine of magnetic tape affords a new means of industrial safety promotion.

The Audio-Vendor, developed by Cousino, Inc., of Toledo, Ohio, serves as an always-on-the-job warning. When activated by remote control, it automatically and continuously repeats messages of from 15 seconds to 15 minutes. The magazine fits any standard tape recorder.

A brochure describing the Audio-Vendor will be sent to anyone addressing his request to Cousino, Inc., 2510 Madison Ave., Toledo 2, Ohio.

Test Moisture On-the-Spot

The Olivo Moisture Meter—an accurate, precise, portable instrument for the measuring of surface moisture in powdered, granulated or fibrous material—is now available in the United States exclusively through Heyl & Patterson, Pittsburgh, Pa.

Simple and easy to operate, the Olivo Moisture Meter can determine



the surface moisture-content of material in less than two minutes, according to Heyl & Patterson. Using other laboratory methods, the same moisture tests would take as long as four hours.

When properly calibrated, the Olivo Moisture Meter is accurate to two percent of surface moisture as compared to standard air-dried surface moisture results.

— Announcements —

At a recent meeting of the board of directors of Heyl & Patterson, Inc., Pittsburgh, Pa., T. P. Butler, former president, was elected chairman of the board. H. R. Edelman, Jr., former executive vice-president, was elected president to succeed Butler.

At the same meeting, E. W. Kahle was elected executive vice-president and J. F. Page secretary-treasurer of the company.

Appointment of Howard L. Brown as manager of its Phoenix district office and the transfer of Carlos E. Milner, Jr., to head company operations at Spokane, Wash., has been announced by Copco Pacific, Ltd., mining and construction equipment distributors.

The appointment of Robert L. Mc-Chain as manager of Coal Mining Machinery Sales of the Cleveland Rock Drill Division of Le Roi Co. has been announced by R. R. Morgan, vice-president. McChain had been in a sales position for several years with Le Roi-Cleveland before this promotion.

Charles Vignos II has been elected president of Ameri-

can Mine Door Co., succeeding his father, the late Charles A. Vignos. Vignos joined the company in 1917 and was elected to the board of directors in 1935. In 1939 he was elected vice-president and



in 1949, secretary-treasurer.

The Jeffrey Mfg. Co. announces the opening of a district office in Salt Lake City, Utah, and the appointment of Carey S. Allen as district manager to handle the products of the company's Mining Division. The office will be located in Rooms 733-4, Judge Bldg., 8 East Third South.

Organizational changes in the Crusher, Screen, and Process Machinery Division of the Nordberg Manufacturing Co. have been announced.

Jack B. Bond is appointed assistant general manager of the Crusher, Screen, and Process Machinery Division in addition to his present duties as sales manager of the division.

Howard M. Zoerb, formerly administrative manager, is appointed divisional consulting engineer in which capacity he will be responsible for application engineering, field contact with major mining and milling organizations and field engineering consultant.

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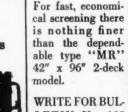
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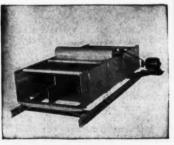
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